

**Document Type:** EA-Administrative Record  
**Index Field:** Final Environmental Document  
**Project Name:** Redbud Reservoir Beech River Watershed Development Authority Land Request  
**Project Number:** 2008-27

## FINAL ENVIRONMENTAL ASSESSMENT

# **REDBUD RESERVOIR BEECH RIVER WATERSHED DEVELOPMENT AUTHORITY LAND REQUEST Henderson County, Tennessee**

**PREPARED BY:**  
TENNESSEE VALLEY AUTHORITY

DECEMBER 2008

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## **FINAL ENVIRONMENTAL ASSESSMENT**

### **REDBUD RESERVOIR BEECH RIVER WATERSHED DEVELOPMENT AUTHORITY LAND REQUEST HENDERSON COUNTY, TENNESSEE**

**TENNESSEE VALLEY AUTHORITY**

**DECEMBER 2008**

#### **The Proposed Decision and Need**

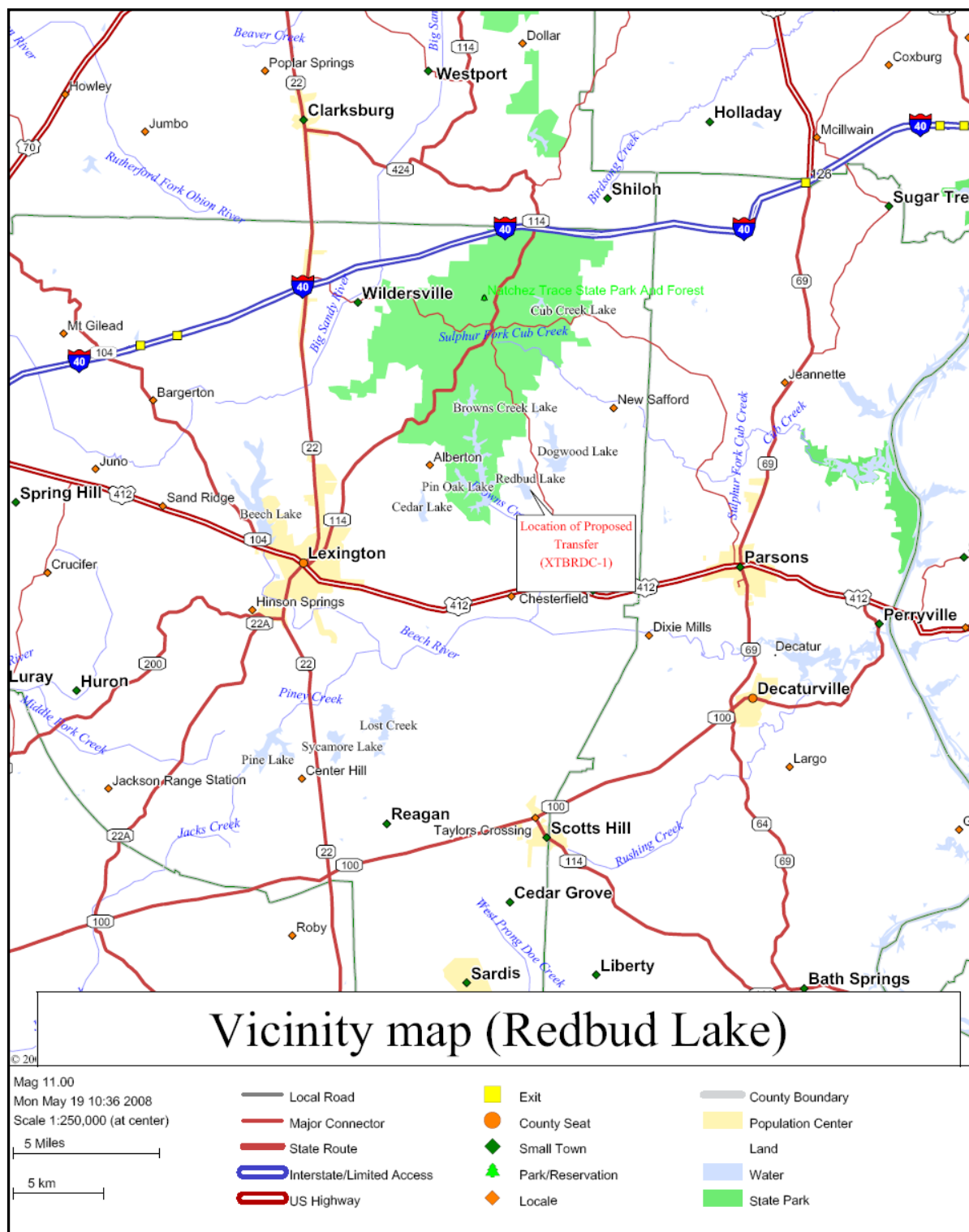
In 1963, Tennessee Valley Authority (TVA) entered into a contractual agreement with Beech River Watershed Development Authority (BRWDA) to cooperate in the management and financing of a water control system to provide for future regional development. BRWDA, which oversees the economic growth of the Beech River area, has requested that TVA sell 71 acres of TVA land adjacent to Redbud Reservoir in Henderson County, Tennessee, for the development of a 63-lot residential community, of which two lots would be retained by BRWDA for use as common lots (see Figure 1). In accordance with existing contractual agreements, BRWDA would act as TVA's agent at a public auction sale of the land pursuant to Section 31 of the *TVA Act*. The subject property lies along the southeast section of the approximately 211-acre reservoir (see Figures 2 and 3). BRWDA's proposal is consistent with the contractual agreement between BRWDA and TVA and conforms to the TVA Land Policy (TVA 2006).

Under the proposed action, TVA would authorize the sale of 71 acres of land at a public auction in accordance with Section 31 of the *TVA Act*, with BRWDA acting as TVA's agent at the auction, with the understanding that the proposed land uses would follow the plat maps BRWDA previously developed with TVA. TVA would also grant BRWDA a permanent easement for construction and maintenance of subdivision roads. Approval of the request would allow TVA to fulfill long-standing contractual obligations between TVA and BRWDA.

#### **Background**

BRWDA was organized under a House Bill in 1961 by the General Assembly of the State of Tennessee with the purpose of developing and executing a plan for comprehensive resource development in the Beech River watershed. BRWDA was given the authority and responsibility for integrated economic development of the watershed and management of Beech River area lands and water. BRWDA sought resources from TVA and the Tennessee State Planning Commission in developing an operating plan for the development of the BRWDA reservoirs (BRWDA 1965). The broad objectives of the plan include:

- The promotion and encouragement of the unified economic development of the Beech River watershed through comprehensive resource development.
- The management of BRWDA lands and water in a manner that will promote sound physical and economic development of the Beech River area.
- The demonstration of one approach to water-based economic development programs through federal, state, and local participation.



**Figure 1. Redbud Reservoir Vicinity Map**

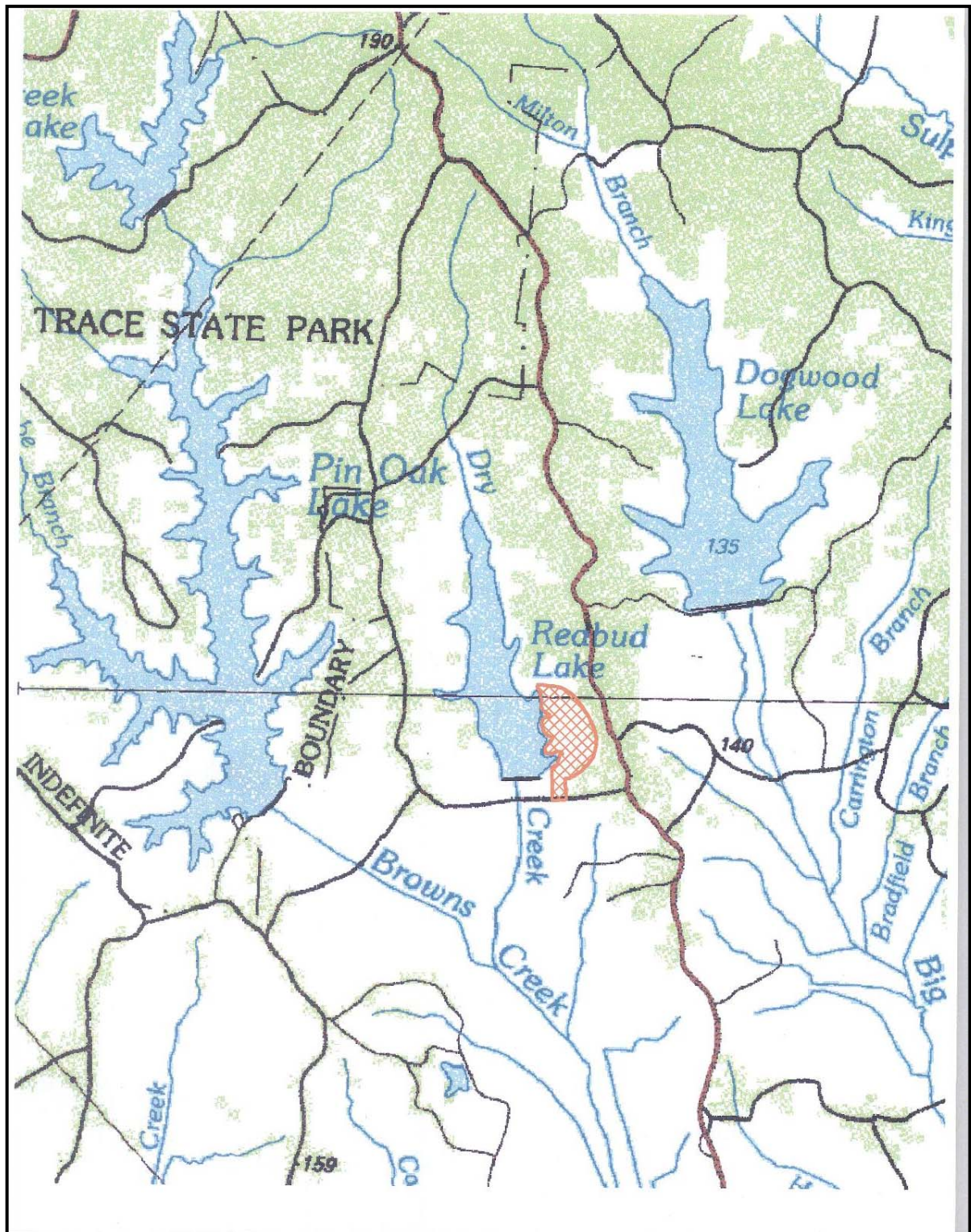


Figure 2. Redbud, Pin Oak, and Dogwood Reservoirs, Browns Creek, and 71-Acre Tract



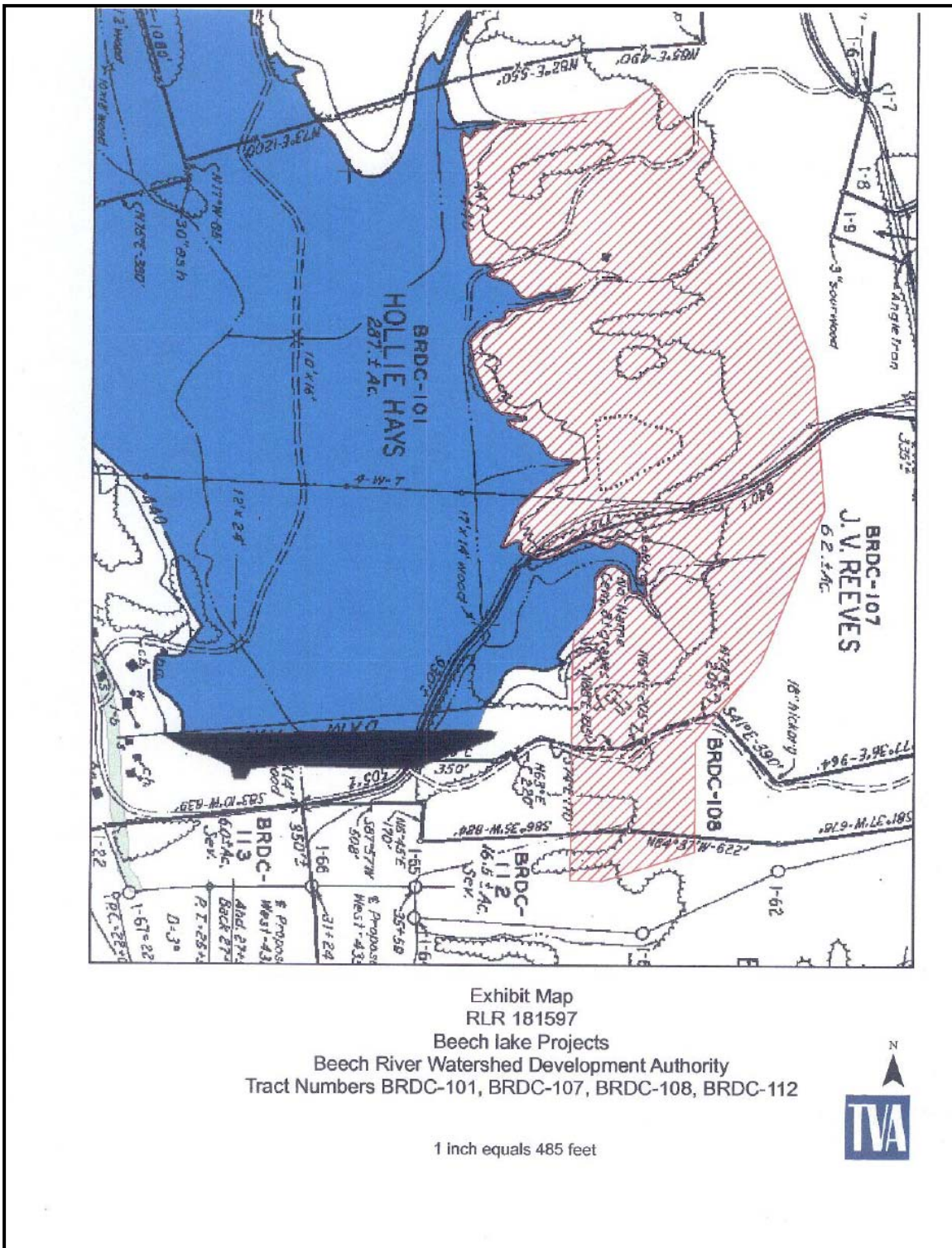


Figure 3. Redbud Reservoir Project Area Exhibit Map

TVA originally entered into a contractual agreement with BRWDA in 1963 with the objective, among others, to advance economic development in the Beech River watershed. TVA and BRWDA have worked together since then to implement the contract and achieve the objectives outlined in the operating plan. BRWDA has slowly implemented the operating plan, which includes water supply to the City of Lexington, development of public recreation facilities, and residential development. The original 1963 contract was revised several times and eventually superseded on January 4, 1989, by Contract No. TV-75181A, but the objectives of the contractual agreement between TVA and BRWDA remain the same.

In November 2006, the TVA Land Policy (TVA 2006) was implemented. In the Land Policy, under "Operational Uses of TVA Properties," the last sentence reads, "In addition, TVA will continue to work with development agencies (and other partners) throughout the Valley to implement previously executed agreements." The contract between TVA and BRWDA has been in existence for many years and represents the type of previously executed agreement referred to in the policy. As a result, this proposal is consistent with the TVA Land Policy.

The Beech River watershed is located in west Tennessee, midway between Nashville and Memphis. The watershed includes 193,000 acres, which account for approximately 35 percent of Decatur and Henderson counties. Redbud Reservoir is a component of TVA's Beech River Project, a cluster of eight reservoirs: Beech, Cedar, Dogwood, Lost Creek, Pin Oak, Pine, Redbud, and Sycamore. Of these reservoirs, Beech and Pine are developed for residential use, and Pin Oak is in the Natchez Trace State Park.

The Beech River system was constructed by TVA and is managed by BRWDA. The reservoirs provide flood control, recreation, and water supply in the Beech River watershed. The reservoirs range in size from 140 surface acres to 875 surface acres and comprise 82.3 shoreline miles.

Redbud Reservoir is impounded by a 31-foot-tall earthen dam. The dam was completed in 1965 and is 1,320 feet in length. Redbud Reservoir is approximately 200 surface acres, has a flood-storage capacity of 680 acre-feet, and stretches 1.5 miles upstream from the dam. The proposed project area lies along the eastern shoreline of Redbud Reservoir in rural Henderson County, Tennessee.

### **Necessary Permits and Public Involvement**

The proposed action was the subject of a public notice (see Attachment A) issued by TVA in local newspapers and on TVA's Web site. The comment period was originally scheduled to end on June 7, 2008, but was later extended to June 30, 2008.

Additionally, TVA has consulted with the Tennessee State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officers.

The proposed land sale would not require TVA to acquire any permits. The future landowner(s) would obtain necessary permits from the U.S. Army Corps of Engineers (USACE), the Tennessee Department of Conservation and Environment (TDEC), and other agencies. Because there is no navigation link to this reservoir, a Section 10 permit would not be necessary. USACE authorization could occur under its recently developed regional permit for certain structures on TVA reservoirs. In addition, the future landowner(s) would

be responsible for obtaining the necessary permits for any shoreline alterations or private water use facilities.

An Aquatic Resource Alteration Permit would be needed if there were any alterations to waters of the state. Subsequent site development may require state storm water permits and local building permits. Coverage under the Tennessee Construction General Permit for Storm Water Discharges from Construction Activities (TNCGP) would be needed for land disturbance of an acre or more. In the case that less than an acre of land is disturbed or waters of the state are not altered, in order to avoid pollution to nearby water, the appropriate erosion- and sedimentation-control measures must be installed and maintained throughout the construction process.

In addition to the coverage required for TNCGP, the future landowner(s) would need to obtain permits from TDEC for septic tank systems; for the application of herbicides into waters; for alteration of wetlands, streams, or the reservoir; and for construction of water use facilities or shoreline stabilization.

## **Alternatives**

TVA considered two alternatives, namely, a No Action Alternative and an Action Alternative.

Under the No Action Alternative, the TVA Board of Directors (TVA Board) would not declare the land surplus at this time, the land would not be sold, and the proposed residential development would not occur. If TVA were to adopt the No Action Alternative, the TVA Board would not authorize the land to be sold, and it would remain in its current condition. The anticipated roads, homes, and water use facilities would not be built. TVA would retain ownership of the 71 acres.

Under the Action Alternative, the TVA Board would declare 71 acres surplus and would authorize the sale of the land at a Section 31 public auction wherein BRWDA would act as TVA's agent. During the planning stages of the overall Beech River project, TVA identified areas that were suitable for residential development on the Beech River projects and developed plat maps for these areas (Attachment B). BRWDA has used the TVA-developed plats to plan its residential developments. In accordance with the TVA plats and BRWDA plans, the 71 acres would be divided into lots to be auctioned individually and subsequently developed for residential use over an anticipated five- to 10-year build-out.

In addition, infrastructure, including roads, water supply, and power lines, would be built for the planned subdivision. To facilitate this infrastructure, under the Action Alternative, TVA would grant a permanent easement to BRWDA for the construction and maintenance of the subdivision roads. Although not part of the currently proposed action, this environmental assessment also addresses the anticipated construction of individual private water use facilities by the waterfront lot owners as well as the development of community water use facilities by BRWDA on the 71-acre tract. Landowners would be required to follow the applicable BRWDA and TVA policies and provisions for water use facilities (Attachment C), including development of a vegetation management plan (VMP) (Attachment D). The water use facility policies and provisions and development of a VMP are intended to conserve and enhance shoreland resources, while providing access to the reservoir.



## **Other Environmental Reviews and Documentation**

In November 1998, TVA completed an environmental impact statement (EIS), *Shoreline Management Initiative: An Assessment of Residential Shoreline Development Impacts in the Tennessee Valley* (TVA 1998). This review evaluated the effects of shoreline residential development and the establishment of standards for associated private water use facilities throughout the Tennessee River system. The Beech River Project reservoirs were included in the Shoreline Management Initiative EIS.

In March 1965, BRWDA, with technical assistance from The Tennessee State Planning Commission and TVA, completed the *Beech River Watershed Development Plan and Program Proposals* (BRWDA 1965). This report described the developing watershed program and its major objectives. The objectives included creating a general development plan and identifying BRWDA's roles in land, water, and economic development in the Beech River area.

## **Affected Environment and Evaluation of Impacts**

The existing environmental conditions and those environmental resources that could be affected by the proposed actions are described in this section. The affected environment descriptions below are based on field surveys conducted May through July 2008, on published and unpublished reports, and on personal communications with resource experts.

The scope of the environmental review includes the entire 71 acres of land and associated shoreline proposed for sale and subsequent residential and associated shoreline development. Evaluation of the proposed project has allowed TVA to conclude that certain resources would not be impacted by the proposed action. These resources include prime farmland, navigation, and solid waste. Resources that could be affected by the proposed request have been given further consideration in this environmental review and include the following:

- Water quality and surface water
- Aquatic ecology
- Terrestrial ecology - vegetation
- Terrestrial ecology - wildlife
- Endangered and threatened species
- Wetlands
- Floodplains
- Natural areas
- Recreation
- Visual resources
- Cultural resources
- Socioeconomics
- Noise

Other than the reforestation of some former fields, the landscape character of Redbud Reservoir has changed little since its impoundment in 1965. The topography of the area is gently to moderately sloping. The adjacent vegetative cover is dominated by mature pine and hardwood forest. The shoreline has experienced minimal erosion, with most bank

sections well vegetated and gently sloping. The water body itself appears to have good clarity with very little turbidity.

#### Water Quality and Surface Water

Precipitation in the project area averages about 51 inches per year with the wettest month in May at 5.8 inches and the driest month in August at 2.7 inches. The average annual air temperature is 59 degrees Fahrenheit (°F), ranging from a monthly average of 37°F in January to 80°F in July. Streamflow varies with rainfall and averages about 23 inches of runoff per year or approximately 1.7 cubic feet per second per square mile of drainage area.

The project area drains to Redbud Reservoir on Dry Creek and subsequently drains to Browns Creek of the Beech River in the Tennessee River basin. Dry Creek and Browns Creek are classified by TDEC for fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. Beech River is classified for domestic and industrial water supply, fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. Portions of Browns Creek and Dry Creek in the Natchez Trace State Park and Forest are designated by the state as Tier 2 (high quality) streams. Outside of the state park and forest, Browns Creek is on the state's *Clean Water Act* 303(d) list as impaired (i.e., not fully supporting its designated uses) due to temperature alterations and habitat loss due to streamflow alteration from an upstream impoundment.

Under the No Action Alternative, no changes in existing surface water and water quality conditions would occur.

Under the Action Alternative, soil disturbances associated with access roads or other construction activities could potentially result in adverse water quality impacts. Soil erosion and sedimentation could clog small streams and threaten aquatic life. Removal of the tree canopy along streams could increase water temperatures, algal growth, dissolved oxygen depletion, and adverse impacts to aquatic biota.

In addition to construction activities, improperly operated wastewater treatment systems (septic tanks) and runoff from lawn fertilizer applications could increase nutrient runoff. Higher nutrient levels would lead to increased primary productivity (algae growth). As algae populations die, their decomposition in deep waters of the reservoir would reduce oxygen concentrations during the summer months.

Boating and boat dock activities could introduce pollutants to the reservoir. Waves from boats may increase shoreline erosion. Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts. Implementation of the policies and provisions for water use facilities (Attachment C) and precautions in the design, construction, and operation of the proposed development and shoreline facilities are expected to minimize these potential impacts.

Attachment C contains provisions for protecting reservoir water quality. These include no permanent structures below the maximum shoreline contour (msc) of the 445.4 elevation, no water-skiing or motorized personal watercraft (PWC), no boathouses, and no boats or floating structures containing living quarters or toilet facilities.

Implementation of the policies and provisions for water use facilities identified in Attachment C would help to minimize impacts to water quality. Furthermore, potential construction-

related impacts would be minimized through each landowner's compliance with TDEC's storm water permitting and septic system permitting processes. Implementation of the following conditions from Attachment C would further minimize water quality impacts resulting from development activities:

Surface Water Conditions:

- Compliance with all applicable environmental laws and regulations, including:
  - a. Obtaining required permits from TDEC for septic systems; for the application of herbicides into waters; and for the alteration of wetlands, streams, or the reservoir associated with construction activities such as seawalls, docks, or boat ramps.
  - b. Providing buffer zones as may be required by TDEC on each side of streams that are listed as impaired.
- Implementation of control measures to prevent the discharge or loss of potential pollutants to the reservoir and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants.
- Compliance with state requirements for septic systems, including having all wastewater disposal septic systems approved by TDEC and set back 2 feet vertically and 50 feet horizontally from the normal maximum reservoir elevation.
- Agreement to apply only USEPA-registered herbicide in areas requiring chemical treatment. Label directions are designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts.

With the proper implementation of these controls, adoption of the Action Alternative is expected to involve only minor temporary impacts to surface water quality.

Aquatic Ecology

Redbud Reservoir is an impoundment of Dry Creek, which is located in the Southeastern Plains ecoregion. Typical streams of this ecoregion have low to moderate gradients with low sinuosity or relatively few bends in the stream, and sandy substrates with moderately stable stream banks (Arnwine 2005). TVA Index of Biotic Integrity (IBI) samples of Browns Creek at Highway 412 (see Figure 2), downstream of Redbud Reservoir impoundment, scored fair for fish and benthic macroinvertebrates. Several metrics are used to derive the IBI, such as number of native species and percentage of tolerant species, to score the biological health of a stream. A list of fish species documented during this sample, which are typical of this region, is included in Attachment E.

A June 2008 field survey of the study area documented 11 watercourses, all of which are tributaries to Redbud Reservoir (ARCADIS 2008). These include five perennial streams and six intermittent streams (Attachment F, Figure F-1). Additionally, a pond occurs as a result of a small man-made impoundment. Aquatic Habitat Assessment forms were completed for all perennial and intermittent streams on the property. A sample Aquatic Habitat Assessment form is included in Attachment F. Habitat scores ranged from 19 to 26. These scores are relatively low when compared to quality streams in the area. Primary

substrates in all streams documented were sand, silt, and gravel. Although crayfish burrows were observed during the field survey, no other aquatic organisms were observed.

Studies of other TVA reservoirs have shown that approximately 50 to 75 percent of nutrients and organic materials that flow into a reservoir settle into the sediment and are filtered out (TVA 1998). Taking this into consideration, a majority of the sediment introduced into Redbud Reservoir as a result of construction activities remain in the reservoir and, therefore, would have minimal impacts on the downstream Browns Creek and Beech River watersheds.

Although fishery data are not available for this reservoir, species likely to inhabit this reservoir are those typical of similar sized impoundments. Currently, none of the shoreline has been developed for residential purposes.

Under the No Action Alternative, there would be no impacts to the aquatic ecology near the proposal area. The existing aquatic ecology conditions and trends in Redbud Reservoir are expected to continue.

Under the Action Alternative, approximately 4,300 feet (about 16.3 percent) of Redbud Reservoir shoreline would be available for potential development. Development along the shoreline and stream corridors of Redbud Reservoir could degrade aquatic habitats (TVA 1998). Within the reservoir, localized, short-term, insignificant impacts would be expected near the potential development. However, at the watershed level, no impacts to Beech River or downstream watercourses would be expected because impacts would be confined to the reservoir pool.

#### Terrestrial Ecology - Vegetation

Redbud Reservoir is located in the Beech River watershed within the Southeastern Plains and Hills, a subdivision of the Southeastern Plains ecoregion (Griffith et al. 1998). This ecoregion is comprised of irregular plains made up of a mosaic of cropland, pasture, woodland, and oak-hickory-pine forest.

The study area consists of the entire 71 acres of land proposed for sale and subsequent residential and associated shoreline development. The majority of the vegetative cover throughout the study area consists of mixed deciduous forest, with variations occurring along the riparian corridors, wetland areas, and along the tops of upland ridges. Land use within the study area consists almost entirely of second-growth or older forests, with a few isolated areas in the intermediate stages of old-field succession. The stream vegetative buffer is typical for moist site riparian zones on Redbud Reservoir including small native trees and shrubs and an herbaceous layer containing native and nonnative plant species. The shoreline area along the reservoir is comprised of a narrow riparian zone with a mix of common native and nonnative plant species. Plant species encountered during field surveys are common and representative of the area, and many are listed in Attachment F. No uncommon or globally rare plant communities are present on or adjacent to the site.

Essentially the entire study area is on land in which the native vegetation has been extensively altered as a result of previous land use history. The presence of invasive plant species within the study area is limited to a stand of Chinese privet near the eastern edge of wetland site WTL-5 (Attachment E) and Japanese honeysuckle, which was found in various locations throughout the study area. Although common along forest edges of nearby roadsides, only one occurrence of a silk tree (*Mimosa*) was observed within the

study area. According to TVA's invasive species criteria, these invasive species are Rank 1 (severe threat) and are of high priority to TVA (James 2002).

Under the No Action Alternative, there would be no impacts to the terrestrial ecology of the region. Because there are no rare terrestrial plant communities present in the study area and the communities present are common and representative of the region, adoption of the proposed Action Alternative would not adversely impact the terrestrial ecology of the region.

#### Terrestrial Ecology - Wildlife

The 75-acre study area consists almost entirely of second-growth or mature oak-hickory forest with patches of eastern red cedar and loblolly pine. Isolated old-field habitats previously used for agriculture occur along the shoreline of Redbud Reservoir. Stream corridors and isolated wetlands provide habitat complexity on the parcel.

A single dirt road is located in the center of the property. All-terrain vehicle tracks are scattered throughout the site. Redbud Reservoir shoreline occupies the western boundary of the study area; isolated wetlands occur in this area; and portions of the shoreline are eroded. The remaining boundaries of the parcel consist of secondary and mature forest stands serving as a buffer to outlying single-family residences and roads (ARCADIS 2008).

The forested upland and low-lying areas throughout the project provide habitat for resident and migratory birds, mammals, reptiles, and amphibians. Mixed densities of understory vegetation provide increased habitat and refuge for various common species. Observations within the study area include 33 bird species, five frog species, four mammal species, five reptile species, 10 insect/arachnid species, and one crayfish. These species are listed in Attachment E and are locally and regionally common and representative of the region. However, three of the birds (ovenbird, hooded warbler, and worm-eating warbler) are uncommon west of the Tennessee River.

Unique and important terrestrial features such as bluffs, vernal pools, bogs, sink holes, caves, and heronries are not known from the study area, and none of these features were observed during field surveys. However, one heron colony is reported approximately 2.8 miles from Redbud Reservoir.

Under the No Action Alternative, the proposed sale tract would likely remain undeveloped, and wildlife and wildlife habitats would not be impacted.

Under the Action Alternative, although some portions of the property would remain forested, much of the forested habitats would be destroyed as a result of the residential development. Wildlife species tolerant of human development or species migrating through residential areas would likely continue to use the land. Species observed during field surveys are locally and regionally common. Due to the presence of similar habitat in the vicinity, adoption of the Action Alternative would not result in significant adverse impacts to wildlife resources.

#### Endangered and Threatened Species

No federally listed species or designated critical habitats are known from within Henderson County. State-listed plants known to occur in Henderson County include American pillwort and hairy umbrella sedge. State-listed terrestrial animals known from the county include Bachman's sparrow, northern pine snake, Bewick's wren, cerulean warbler, coal skink, southeastern shrew, and jumping mouse.



Although the two state-listed plants are known from similar habitat at nearby Dogwood Reservoir (see Figure 1), neither of the plants was found within the study area. Additionally, no state-listed animal species were observed in the study area, although the site contains favorable habitat for all of the state-listed animal species known from Henderson County. While one state-listed fish, firebelly darter, is known from Henderson County, the firebelly darter is not known to occur in the Beech River watershed.

Although Indiana bats are not known to occur in Henderson County or surrounding counties, TVA assesses the potential for proposed actions to affect the federally listed as endangered species according to terms of an agreement between TVA and the U.S. Fish and Wildlife Service (USFWS). As a result of forest site sampling, it has been determined that suitable summer roosting habitat exists in two distinct areas of the property; for that reason, potential for the species to occur could not be ruled out. No caves or other appropriate winter hibernacula<sup>1</sup> were found on the site. Indiana bats hibernate in caves during the winter and typically form summer roosts under the exfoliating bark of dead or dying trees (Menzel et al. 2001). Their summer roosts are found in mature forests with an open subcanopy, usually near water (Romme et al. 1995), and they primarily forage in forested areas along streams or other corridors.

Indiana bats roost under slabs of exfoliating bark of either live or dead snags, with a preference towards snags (Menzel et al. 2001; Romme et al. 1995). Several snags and hickories with exfoliating bark were found near wetland sites WTL-2 and WTL-6 (see Attachment F, Figure F-1 for wetland locations). WTL-2 had an abundance of snags greater than 20 centimeters in diameter and 5 meters tall. The snags were covered with 10 to 20 percent exfoliating bark. These habitat parameters are characteristic of moderate quality Indiana bat summer habitat (Menzel et al. 2001; Romme et al. 1995). The area adjacent to WTL-6 also presented moderate quality roosting habitat with abundant shagbark hickories; however, this area exhibited a moderately dense understory, lowering the overall quality of the potential summer habitat.

In order to minimize potential impacts to Indiana bats, TVA would require implementation of mitigation measures in the areas described above as having moderate Indiana bat habitat.

The designated tracts of land with potential habitat would be restricted to the following:

- Potential landowners of this property would be restricted to clearing potential Indiana bat roost trees between the months of October 15 and March 31.
- Forest clearing could be allowed during summer months, but only after an Indiana bat survey was performed.
- TVA will provide landowners with a list of qualified bat surveyors. Landowners must submit a survey plan to TVA for approval before the survey is conducted. If no Indiana bats are located during these surveys, tree clearing can begin.
- If Indiana bats are captured during summer surveys, clearing of suitable habitat would not be permitted outside of the dates October 15 and March 31.

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<sup>1</sup> A hibernaculum (plural is hibernacula) is a place, such as a cave or burrow, where hibernating animals can find adequate shelter for their hibernation period.

- Potential landowners would be required to provide TVA and the USFWS with results of any bat surveys for their concurrence before clearing would be permitted.

Under the No Action Alternative, the proposed tract would not be developed at this time, and the status and conservation of potentially affected endangered and threatened species and critical habitats would not be impacted.

Implementation of the Action Alternative has the potential to affect federally listed Indiana bats and their habitat. The adoption of the Action Alternative would not result in impacts to state-listed animal species or their habitats given the large amount of suitable habitat in the vicinity and the animals' capability to relocate to these areas. With the implementation of mitigation measures, TVA has determined that adoption of the Action Alternative is not likely to adversely affect populations of Indiana bats. USFWS has concurred with this determination in a letter dated November 14, 2008. Furthermore, impacts to state-listed and federally listed aquatic animal species or plant species are not anticipated under the Action Alternative.

#### Wetlands

Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVARAM), wetlands on the proposed sale tract were categorized by their functions, sensitivity to disturbance, rarity, and ability to be replaced. The categorization was used to evaluate potential effects to wetlands and to determine the appropriate levels of mitigation for wetland impacts. According to TVARAM, wetlands are classified into three categories (Table 1).

**Table 1. Wetland Classifications**

Category	Description	Preferred Mitigation	Wetlands Observed
Category 1	Limited quality waters represent degraded aquatic resources having limited potential for restoration	Lower standards for avoidance, minimization, and mitigation can be applied	None observed
Category 2	Wetlands of moderate quality and wetlands that are degraded but that have reasonable potential for restoration	Avoidance and minimization are the preferred mitigation	2.58 acres
Category 3	Wetlands of very high quality or of regional/statewide concern, such as wetlands that provide habitat for threatened or endangered species	Avoidance and minimization are the preferred mitigation	None observed

Wetland delineation performed in May 2008 by ARCADIS indicated that nine wetlands totaling 2.58 acres are within the study area (Attachment F). All wetlands present on the site rank as moderate quality (Category 2) in terms of their ecological functions. The largest wetland is associated with a pond/impoundment. It contains 1.65 acres and is a mix of forested and open water habitat. The pond is distributed over proposed Lots 43, 44, 47, and 48 (see Attachment B). The remaining wetlands range in size from 0.02 acre to 0.25 acre and are generally associated with the shoreline of Redbud Reservoir; however, some occur along small tributary streams.

Under Section 4 of Executive Order (EO) 11990, TVA is obligated to establish mechanisms for protection of wetlands on lands proposed for sale.

*“When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or (c) withhold such properties from disposal.” (Strand 1997)*

To meet this requirement, restrictive covenants would be included in the property deeds. The following or similar measures would be incorporated into the restrictive deed covenants.

- Landowners would not be permitted to build structures, operate equipment, or make improvements of any nature on any portion of the wetland area, make any modifications to or alter any wetlands, including dredging activities, or place fill material on any portion of the easement area.
- Landowners are to conduct activities that could affect any wetlands in accordance with Section 404 of the *Clean Water Act* as well as all other federal, state, or local statutes or ordinances relating to wetland regulations.
- The wetlands associated with the pond occurring on Lots 43, 44, 47, and 48 are to remain intact.

Implementation of the policies and provisions for water use facilities, including the development of VMPs (Attachments C and D), would minimize potential adverse impacts to wetlands. The pond and the associated wetlands on Lots 43, 44, 47, and 48 are to remain intact. Wetlands on site have been flagged on the ground and mapped with GPS (global positioning system). Wetland maps with GPS coordinates would be provided to the BRWDA for inclusion in the final subdivision development plan.

Under the No Action Alternative, wetlands would be left undisturbed, and no impacts to wetlands or their functions are anticipated. Under the Action Alternative, there would be minor functional impacts to the wildlife habitat value of wetlands if surrounding upland habitat were cleared for residential development. This change is expected to be minor within the context of the larger watershed and ecoregion. With restrictive deed covenants in place and implementation of the policies and provisions for water use facilities and VMP guidelines (Attachments C and D), potential wetland impacts would be minimized or avoided, and overall impacts to wetlands would be insignificant.

### Floodplains

As a federal agency, TVA is subject to the requirements of Executive Order (EO) 11988 on floodplain management. The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances.

The area potentially impacted by the proposed action extends from Dry Creek miles 0.9 to 1.5. Flood information is not available for Dry Creek downstream of Redbud Dam (Dry Creek Mile 1.03). Upstream of Redbud Dam from Dry Creek miles 1.03 to 1.5, the approximate 100-year floodplain is the area lying below elevation 444.0. The approximate 500-year flood elevation from Dry Creek miles 1.03 to 1.5 is 444.5. The msc is elevation 445.4.

Under the No Action Alternative, the TVA Board would not declare the land surplus, the land would not be sold, and the proposed residential development would not occur. There would be no impact to floodplains, and any proposed future development within the 100-year floodplain and/or the land subject to the TVA flowage easement would be reviewed by TVA to ensure compliance with EO 11988.

Under the Action Alternative, TVA would declare as surplus and authorize the sale of 71 acres of land at public auction with BRWDA acting as TVA's agent. Future activities would involve the construction of individual private water use facilities by the waterfront lot owners as well as the development of community water use facilities by BRWDA.

Construction of roads, water supply, power lines, individual water use facilities, and community water use facilities may involve activities within the 100-year floodplain. Consistent with EO 11988, these are considered repetitive actions in the floodplain that would result in minor impacts. Compliance with the policies and provisions for water use facilities (Attachment C) would minimize adverse floodplain impacts.

To ensure that development of this tract would not adversely impact floodplains and flood control, the following conditions found in Attachment C would be included in the transfer agreement.

- Any future facilities or equipment subject to flood damage would be located above the approximate 500-year flood elevation 444.5.
- You are advised that TVA retains the right to flood this area (up to the msc elevation 445.4) and that TVA would not be liable for damages resulting from flooding.

#### Natural Areas

No natural areas, including Nationwide Rivers Inventory streams, occur at or adjacent to the proposed sale tract. The Natchez Trace State Park/State Forest/Wildlife Management Area is approximately 1.0 mile west/northwest of the site. This 48,000-acre area is managed jointly by the Tennessee Division of State Parks, Tennessee Division of Forestry, and Tennessee Wildlife Resources Agency for recreation, forest products, and small and big game hunting. The park is not connected with the Natchez Trace Parkway.

No impacts to natural areas are anticipated as a result of implementing the No Action Alternative. Because there is sufficient distance between the proposed action and the Natchez Trace State Park, no adverse impacts to any natural areas are anticipated under the Action Alternative. Because of increased population in the area, there could be a minor increase in use of this natural area.

#### Recreation

With 211 surface acres, Redbud is one of the smaller reservoirs in the Beech River system and receives relatively low recreational use. BRWDA estimates that recreation use averages 10 persons per day. Primary recreation activities include fishing, picnicking, informal or primitive camping, and hunting. Approximately 80 percent of the use occurs on weekends and holidays. Because of Redbud's small size, the use of motorized PWC or water-skiing would not be permitted on the reservoir. Public recreation facilities are limited to a boat-launching ramp with parking for about 15 vehicles and trailers on the east bank adjacent to the dam.

As previously mentioned, Redbud is part of an eight-reservoir system in the Beech River watershed. Dry Creek Reservoir is not included in this analysis because it is not used for recreation; it serves only for water retention. As indicated by the visitation estimates (see Table 2), three of the reservoirs in the system account for over 90 percent of total recreation use, and each has substantial recreation development (day use areas, boat-launching ramps, lodging, and/or campgrounds) to accommodate this use. In addition, residential development around Beech and Pine reservoirs contributes to the more intensive recreation use of these two reservoirs.

**Table 2. Surface Acres and Estimated Recreation Use Levels of Reservoirs in Beech River Watershed**

	Reservoir						
	Cedar	Redbud	Sycamore	Pine	Dogwood	Pin Oak*	Beech
Surface Acres	153	211	224	490	491	690	864
Daily Users	10	10	25	137	15	137 <sup>1</sup>	464

\*Managed by the State of Tennessee as part of Natchez Trace State Park. Park staff estimates that Pin Oak use levels are similar to Pine Reservoir.

The other five reservoirs are similar in character; however, they are generally smaller, and development is limited to modest-size boat-launching facilities. No residential development has occurred on these reservoirs. There is also a group camp on Sycamore. The majority of the lands around these reservoirs are natural and wooded. In addition to Redbud, BRWDA prohibits motorized personal watercraft and water-skiing on Dogwood, Cedar, and Sycamore reservoirs.

Recreation-related impacts associated with the implementation of the proposed Action Alternative include impacts on the informal recreation use presently found on the 71-acre development site, some shifts in public reservoir recreation use, and increases in recreation use by future residents of the proposed residential development.

Once the development is constructed, existing informal use such as hunting, picnicking, and primitive camping would be eliminated on the development tract. Site development could also displace duck hunting from the entire lower portion of the reservoir. Because the tract represents a relatively small portion of public lands around Redbud, these uses could shift to other land around the reservoir.

Under the No Action Alternative, no change to the baseline recreation resource would occur. Under the Action Alternative, increases in overall reservoir use would be expected from future residents of the proposed development. Given the current low levels of public use on this reservoir and the modest scale of the residential proposal, this increase would not have a large impact on recreation use by the general public. However, the presence of a residential area on this undeveloped reservoir would affect some users in the vicinity, such as those who hunt on and around the reservoir. Furthermore, those who currently enjoy using Redbud Reservoir because of its low use and natural, undeveloped character would also be affected by the presence of a residential area. Dogwood and Cedar reservoirs, which are similar in character and use to Redbud, would provide similar recreational uses. Potential increases in recreation use of Dogwood and Cedar reservoirs



resulting from these shifts would be insignificant. Under the Action Alternative, there would be no significant impacts to recreation.

### Visual Resources

Visual resources are evaluated based on existing landscape character, distances of available views, sensitivity of viewing points, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape through the course of human alteration (scenic integrity).

The landscape character of Redbud Reservoir has changed since its impoundment in 1965. Before the Beech River watershed's impoundment, forest comprised approximately 49 percent of the watershed's land area (BRWDA 1965). Many formerly open fields are now reforested. The majority of the 71-acre study area is now forested. The shoreline has experienced minimal erosion, with most bank sections being well vegetated and gently sloping. The water body itself appears to have good clarity with very little turbidity. The viewshed is limited primarily to the foreground (0 feet up to 0.5 mile from the observer) and middleground (0.5 mile up to 4 miles from the observer) viewing distances due to the forest that surrounds the reservoir and the meandering shoreline. At its widest point, the views on the reservoir are limited to just over 0.5 mile, and along its north/south axis, views open to almost 1.5 miles. Development is generally visible only to the south, where a water control structure is visible near the center of the earthen dam, and a small parking lot (about 15 vehicle and trailer spaces), single-lane boat ramp, and courtesy pier are visible along the western shoreline. The area is sparsely populated, and the number of existing recreational reservoir users is generally low. The existing scenic attractiveness is common, and the existing scenic integrity is moderate to high. Under the No Action Alternative, no changes to the visual landscape would occur; therefore, no impacts to visual resources would occur.

Under the Action Alternative, the proposed development would impact scenic integrity because it would result in the removal of a good deal of forest from the proposed sale tract as a result of construction of single-family homes and water use facilities. The single-family residences would be visible from the foreground, intermittently, through the shoreline vegetation and access corridors. Recreational reservoir users within the southern two-thirds of Redbud Reservoir would have views of the water use facilities.

Although adoption of the Action Alternative would impact the existing landscape character and scenic value visible from positions described previously, similar landscape character and scenic values may be experienced by individuals at nearby Dogwood and Cedar reservoirs.

Furthermore, the policies and provisions for water use facilities (Attachment C) and the VMP guidelines (Attachment D) contain protective measures that would reduce visual impacts to the area, such as:

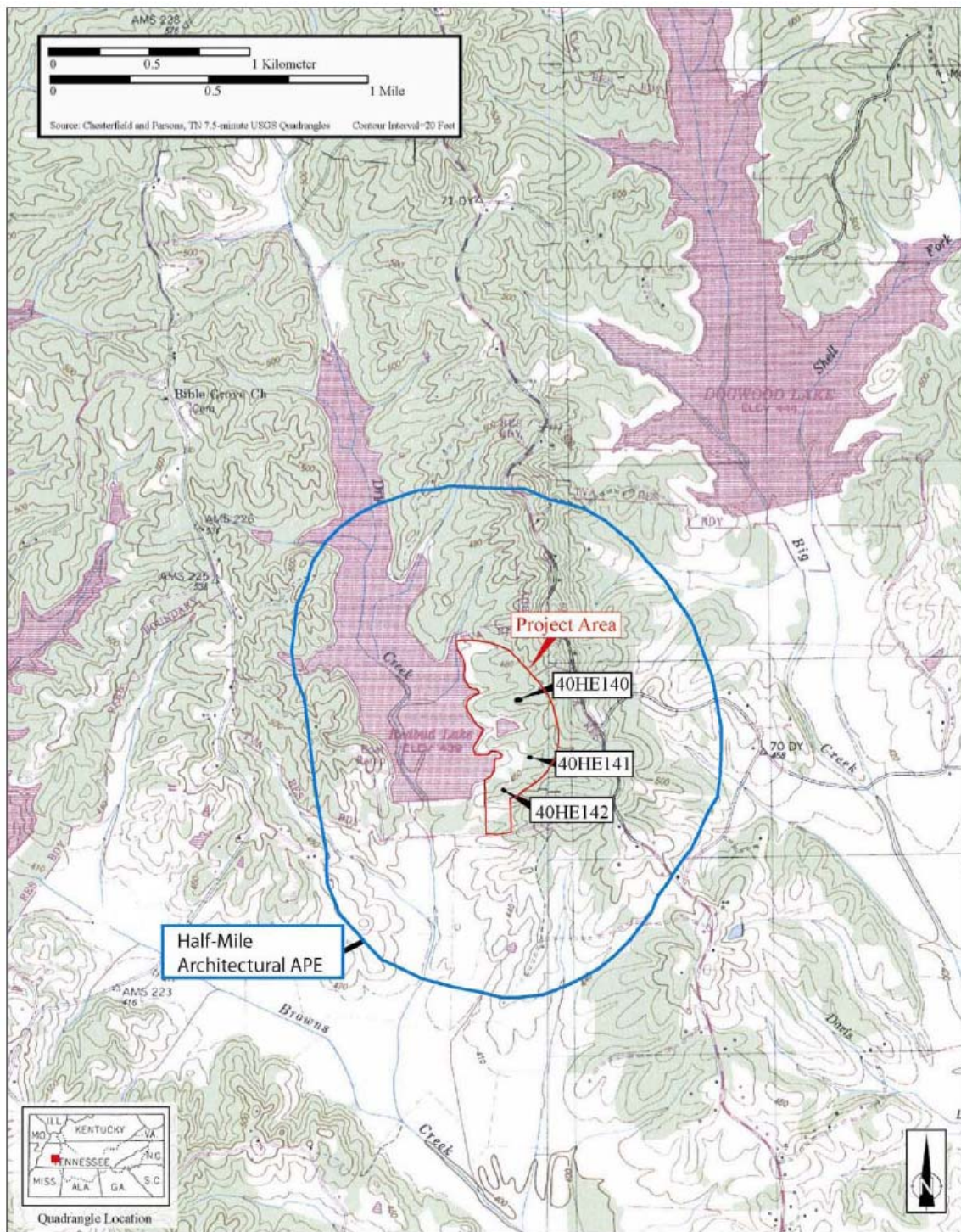
- Vegetation may be cleared to create and maintain an access corridor up to but not exceeding 20 feet wide.
- Clearing of vegetation for 50 linear feet landward in from the normal pool elevation is not permitted.
- Cutting/clearing of vegetation less than 3 inches from the landward 50-foot limit to the msc of the 445.4 elevation is permitted.

Therefore, with the implementation of the policies and provisions for water use facilities (Attachment C) and development of a VMP (Attachment D), adoption of the Action Alternative, as proposed, would not significantly impact the existing landscape character of the area.

### Cultural Resources

Pursuant to the *National Historic Preservation Act of 1966*, TVA takes into account the effects of its actions on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP). The regulations implementing this section of the act (36 Code of Federal Regulations Part 800) state that a federal agency must determine whether historic properties are present within the area of potential effect (APE) and avoid adversely affecting them. The APE for this project was determined by TVA and the Tennessee SHPO to be the proposed 71-acre sale tract for archaeological resources and the area within 0.5 mile of the tract for architectural resources (see Figure 4).

TVA contracted with TRC Solutions Inc. to survey the 71-acre tract for archaeological resources and examine the larger APE for any NRHP-eligible structures that may be adversely affected by the Action Alternative. Fieldwork for this survey took place in May 2008 (McKee and Karpynek 2008). No NRHP-listed or -eligible structures were found in the architectural survey of this area. The archaeological survey included a pedestrian survey of the entire area and systematic shovel testing of level areas suitable for prehistoric and historic occupation. Three archaeological sites were identified during the survey.



**Figure 4.** Detail of the Chesterfield and Parsons, Tennessee, 7.5 United States Geological Survey Quadrangles, Showing Area of Potential Effect (McKee and Karpynec 2008)

Site 40HE140 consisted of a light surface scatter of handmade bricks and a light subsurface scatter of brick, ceramic, and glass artifacts dating to the late 19<sup>th</sup> and early 20<sup>th</sup> centuries (McKee and Karpynec 2008). Although this may represent a historic residence, no intact deposits were identified, in part because of a later disturbance (construction of a pond). The authors deemed this site not eligible for the NRHP.

Site 40HE141 is an ephemeral historic occupation. It was identified by the presence of a brick-lined well adjacent to an intermittent stream. A level area adjacent to the stream was shovel-tested for evidence of a historic residence. Only one artifact was recovered, a fragment of a cast iron stove. The presence of factory-made bricks and Portland cement in the well suggests a 20<sup>th</sup> century occupation. The lack of artifacts and any associated intact deposits renders this site not eligible for the NRHP.

Site 40HE142 is a historic cemetery. This cemetery is identified on the 1963 TVA acquisition maps for Redbud Reservoir. TRC archaeologists found two of the four boundary posts still in place. Two others were on the ground but very close to their original positions defining a 100-foot by 50-foot space. Two unengraved stone markers are present, but there is no historic documentation indicating the number or identity of the graves present. Cemeteries such as this are not eligible for the NRHP, but are protected by state law (Tennessee Code Annotated §§ 39-17-311, 39-17-312, 11-6-107(d), 11-6-116, 11-6-119, and 46-4-101). TRC and TVA archaeologists conclude that, although it is not eligible for the NRHP, this cemetery would be protected through restrictive covenants.

Using this report as evidence of reasonable investigation of the APE, TVA consulted with the Tennessee SHPO and the appropriate Tribal Historic Preservation Officers. In a letter dated July 22, 2008 (see Attachment A), TVA communicated to the SHPO that the lot with the cemetery would be sold with a restrictive covenant to prevent grave desecration with the following or similar language:

“Grantee shall restrict use of the area for cemetery purposes only. Grantee acknowledges by acceptance of the deed said area has been designated as a cemetery and will not build, disturb, or excavate said area except to maintain as a cemetery. Grantee may maintain said area by mowing or using customary lawn tools.”

In a letter dated July 31, 2008, the Tennessee SHPO concurred with TVA’s determination that the proposed action would not adversely affect any historic properties eligible for or listed in the NRHP (see Attachment A).

The following federally recognized tribes were notified of this finding and were invited to participate in consultation: Cherokee Nation, Eastern Band of Cherokee Indians, United Keetoowah Band of Cherokee Indians in Oklahoma, The Chickasaw Nation, Choctaw Nation of Oklahoma, Jena Band of Choctaw Indians, Muscogee (Creek) Nation of Oklahoma, Alabama-Coushatta Tribe of Texas, Alabama-Quassarte Tribal Town, Kialegee Tribal Town, Thlopthlocco Tribal Town, Absentee Shawnee Tribe of Oklahoma, Eastern Shawnee Tribe of Oklahoma, and The Shawnee Tribe. Only the Choctaw Nation of Oklahoma, United Keetoowah Band of Cherokee Indians in Oklahoma, and Jena Band of Choctaw Indians chose to participate in the process. The complete responses from these tribes are included in Attachment A.

The Choctaw Nation of Oklahoma responded indicating that the project is out of their area of interest. The Jena band of Choctaw Indians responded with a no significant impacts determination. The United Keetoowah Band of Cherokee Indians in Oklahoma response did not address the conclusions of the report or TVA's NRHP determinations. They did state that they would like to see an additional covenant, which includes possible inadvertent discoveries in the future.

To the extent that any human remains are inadvertently discovered after the property is transferred out of federal control, applicable state laws would dictate the appropriate protocol and should provide adequate protection.

Under the No Action Alternative, the development would not occur, and the land would remain in its current condition. Implementation of the No Action Alternative would result in no impacts for historic properties. Implementation of the Action Alternative has potential to impact historic properties. Two archaeological sites 40HE140 and 40HE141 are not eligible for the NRHP. Any impact would not result in loss of significant information or artifacts. Site 40HE142 is a historic cemetery. If the lot encompassing the cemetery were sold with the aforementioned restrictive covenants in place, there would be no impact on this cemetery. In addition to the deed covenant restrictions and state law protocols, the following conditions are included in the policies and provisions for water use facilities in Attachment C. Implementation of these conditions would minimize potential impacts to inadvertent cultural resource discoveries in the future.

- Landowners agree that if any historical or prehistoric archaeological material (such as arrowheads, broken pottery, bone, or similar items) is encountered during construction of the structure or facility, you would immediately contact BRWDA, who would then contact TVA's Kentucky Reservoir Watershed Team and temporarily suspend work at the location until authorized by BRWDA and TVA to proceed.
- The *Native American Graves Protection and Repatriation Act* and the *Archaeological Resources Protection Act* apply to archaeological resources located on the premises.

### Socioeconomics

The Henderson County population in 2007 was 26,749 according to population estimates by the U.S. Census Bureau. Henderson County is heavily rural, with more than 76 percent of its population living in rural areas.

The proposed development is on Census Tract 9750, Block Group 1, Block 1063. As of the 2000 Census of Population, the total population of this block was four individuals. No minority population was reported. Income data are not available at this level; however, in Block Group 1, the poverty rate was 7.8 percent. This is well below the poverty rate in the county (12.4 percent), the state (13.5 percent), and the nation (12.4 percent).

Under the No Action Alternative, the development would not occur; therefore, no impacts to socioeconomics would occur. Under the Action Alternative, construction and furnishing of homes would provide insignificant positive economic impacts to the county and the surrounding area. The significance of other impacts would depend in part on the number of lots used as full-time residences and the number used for vacations or weekends. Both full-time and part-time use would provide insignificant economic impacts to the area.



However, the impact from vacation or part-time use would be lower because local spending would be considerably less on average than for full-time residents.

Due to the location, it is anticipated that most of the lots would likely be used either by retirees or for occasional vacation or weekend use. The permanent population increase likely would be small, fewer than 100. Part-time usage likely would result in a noticeable temporary influx at peak times such as around Independence Day and Labor Day.

Expenditures by the residents, full- and part-time, of these lots would provide a small increase in sales of businesses in the area. While the overall impact would be marginal, some establishments such as restaurants and convenience stores located nearby might experience a noticeable impact at times. Local tax revenues would increase somewhat due to increased property values and retail sales. Although there would be increases in local tax revenues and retail sales, the increases would occur over an anticipated five- to 10-year period and, therefore, would be incremental. The increase in local tax revenues generally would not be noticeable. No significant adverse impacts to socioeconomics are anticipated as a result of adopting the Action Alternative.

### Noise

The proposed residential development on Redbud Reservoir would generate typical noise in the immediate area. The construction of roads, utilities, and houses would require the use of graders, dozers, compactors, and similar equipment. This type of equipment would generate noise levels ranging from 86 to 95 decibels at 50 feet. Due to the temporary nature of these activities, noise from construction would not cause a significant impact.

Water-skiing and motorized PWC would not be permitted on Redbud Reservoir. The proposed development would increase the number of boats on Redbud Reservoir, especially during the peak recreational season. However, due to the small size of the development and the use restrictions on Redbud Reservoir as described in the policies and provisions for water use facilities (Attachment C), this increase in boat traffic would not cause a significant adverse impact on the noise environment.

Under the No Action Alternative, no project-related noise would be generated; therefore, no noise impacts would occur. Implementation of the Action Alternative would generate typical noise associated with construction and boating activities. However, due to the intermittent nature of home construction and implementation of BRWDA boating restrictions, noise impacts would not be significant.

### **Cumulative Impacts**

Resources that could cumulatively be affected by the proposed Redbud Reservoir subdivision development are water quality, recreation, visual resources, and socioeconomics.

Water quality would continue to be affected by general growth in the area. In order to avoid contributing to water quality degradation in the area, TVA would require use of erosion-control measures during construction of the homes and water use facilities. Section II, Environmental Standards and Conditions of Attachment C, further describes standard measures that would be required in order to minimize impacts to water quality.

#### A. General Conditions

1. Landowners agree to make every reasonable effort to construct and operate the facility in a manner to minimize any adverse impacts on water quality, aquatic life, wildlife, vegetation, and natural environmental values.
2. Landowners would not use or allow the use of the premises, facilities, or structures for any purposes that would result in draining or dumping into Redbud Reservoir of any refuse, sewage, or other material in violation of applicable standards or requirements relating to pollution control of any kind now in effect or hereinafter established.
3. A vegetation management plan (VMP) would be developed by landowners to appropriately manage Redbud Reservoir shoreline.
4. Disturbed sites must be promptly stabilized with seeding, vegetative planting, erosion-control netting, and/or mulch material.

#### B. Surface Water

1. Compliance with all applicable environmental laws and regulations.
2. Implementation of control measures to prevent the discharge or loss of potential pollutants to the reservoir and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants.
3. Compliance with TDEC standards for septic systems, including the requirement that all wastewater disposal septic systems must be approved by the state and be set back 2 feet vertically and 50 feet horizontally from the normal maximum reservoir elevation.
4. Agreement to apply only USEPA-registered herbicide in areas requiring chemical treatment. Label directions are designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts.

Additionally, to further avoid contributing to water quality degradation in the area, additional standard erosion-control measures (Attachment C, Section II [Environmental Standards and Conditions], H [Best Management Practices]) during construction would be required, such as limiting the removal of woody shoreline vegetation and installation of cofferdams and/or silt control structures prior to any soil-disturbing construction activity and utilization of a floating silt screen during excavation or dredging to prevent sedimentation in surrounding areas.

Presently, there are no additional residential or other development projects underway or being considered for Redbud Reservoir. Moreover, no developments are underway or planned for Dogwood and Cedar reservoirs, the reservoirs most similar to Redbud in recreational attributes. Cumulative recreation impacts are expected to be insignificant.

Visual cumulative impacts would include the incremental loss of a naturally appearing landscape concentrated in the 71-acre study area. Because other areas of the reservoir are not planned to be developed in the foreseeable future, the visual integrity would remain the same on all other lands surrounding the reservoir.

The population of Henderson County has grown more slowly than both the state and national averages. Furthermore, development, including development of recreation, camping, and residential facilities, around the Beech River area has not been substantial. Although this development has the potential to increase the population in the area, the addition of approximately 60 homes would have no noticeable cumulative socioeconomic impacts.

Although the proposed development would have a somewhat greater impact than the No Action Alternative, the Action Alternative would result in an insignificant impact on the environment once the development was completed. Therefore, TVA has determined that cumulative impacts of this action would be insignificant.

### **Mitigation Measures**

TVA proposes the following measures to minimize and mitigate the adverse effects of this proposal.

1. The designated tracts of land with potential Indiana bat habitat would be restricted to the following:
  - A. Potential landowners of this property would be restricted to clearing potential Indiana bat roost trees between the dates of October 15 and March 31.
  - B. Forest clearing could be allowed during summer months, but only after an Indiana bat survey was performed.
  - C. TVA will provide landowners with a list of qualified bat surveyors. Landowners must submit a survey plan to TVA for approval before the survey is conducted. If no Indiana bats are located during these surveys, tree clearing can begin.
  - D. If Indiana bats are captured during summer surveys, clearing of suitable habitat would not be permitted outside the dates of October 15 and March 31.
  - E. Potential landowners would be required to provide TVA and the USFWS with results of any bat surveys for their concurrence before clearing would be permitted.
2. The designated tracts of land with wetlands would be restricted to the following:
  - A. Landowners would not be permitted to build structures, operate equipment, or make improvements of any nature on any portion of the wetland area, make any modifications to or alter any wetlands, including dredging activities, or place fill material on any portion of the easement area.
  - B. Landowners are to conduct activities that could affect any wetlands in accordance with Section 404 of the Clean Water Act as well as all other federal, state, or local statutes or ordinances relating to wetland regulations.
  - C. The wetlands associated with the pond occurring on Lots 43, 44, 47, and 48 are to remain intact.

3. The area designated as a cemetery on Lot 59 is to be used for cemetery purposes only. The area designated as a cemetery would not be built upon, disturbed, or excavated. The cemetery may be maintained by mowing or using customary lawn tools.

### **Standard Environmental Protection Requirements**

In order to minimize potential impacts to resources, the policies and provisions for water use facilities in Attachment C would apply to any shoreline alterations on the proposed sale tract. These guidelines and conditions are designed in part to minimize disturbance of riparian areas and subsequent erosion and sedimentation that can move into the reservoir. Additionally, the future landowner(s) would obtain necessary permits from USACE, TDEC, and other agencies.

### **Preferred Alternative**

TVA's preferred alternative is the Action Alternative, under which the TVA Board would authorize the sale of the 71 acres of land at a Section 31 public auction. Under this alternative, BRWDA would act as TVA's agent with the understanding that the proposed land uses would follow the plat maps BRWDA previously developed with TVA. In addition, under the Action Alternative, TVA would grant to BRWDA a permanent road easement for the construction and maintenance of subdivision roads. Approval of the request would allow TVA to fulfill long-standing contractual obligations between TVA and BRWDA.

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## **Attachments**

- Attachment A. Public Comments on the Draft Environmental Assessment, TVA Responses to Comments, and TVA Public Notices
- Attachment B. Subdivision Plat for Redbud Lake Unit 1 – Lots 1-10, 49-63  
Subdivision Plat for Redbud Lake Unit 1 – Lots 11-48
- Attachment C. Policies and Provisions for Water Use and Related Facilities on Redbud Reservoir
- Attachment D. Vegetation Management Plan Guidelines
- Attachment E. Summary of Plant and Animal Species Found Within the Study Area as Reported by ARCADIS Biologists
- Attachment F. Summary of Wetland and Aquatic Resources Assessments

**Attachment A - Public Comments on the Draft Environmental Assessment, TVA  
Responses to Comments, and TVA Public Notices**

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## Redbud Reservoir BRWDA Land Request

### Public Comments on the Draft Environmental Assessment and TVA Responses to Comments

Fifteen agencies, organizations, and individuals were directly contacted to solicit comments on the Redbud Reservoir BRWDA Land Request Draft EA. Comments were received from Southwest Tennessee Development District (SWTDD), U.S. Fish and Wildlife Service (USFWS), Tennessee Wildlife Resources Agency (TWRA), and Tennessee Department of Environment and Conservation (TDEC) Water Pollution Control.

The SWTDD commented that it has no conflicts with any needs, plans, or priorities regarding the proposed project.

**Response:** Comment noted.

The USFWS responded regarding the potential for endangered and threatened Indiana bats to occur on the 71-acre tract requested for development. The USFWS indicates that it concurs with TVA's determination of not likely to adversely affect and that the requirements of Section 7 of the *Endangered Species Act* (ESA) have been fulfilled.

**Response:** TVA will comply with requirements of Section 7 of the ESA.

The TWRA expressed concern about the shoreline, natural habitat, and landscape that would be impacted by the proposed development. In addition, TWRA expressed further concern regarding impacts that would result from water use facilities and increased boating recreation.

**Response:** As documented in the draft EA, TVA has taken steps to lessen potential impacts to shoreline and aquatic habitat as a result of likely new water use facility construction. The Environmental Standards and Conditions section in Attachment C of the draft EA includes specific measures and best management practices designed to minimize impacts to shoreline vegetation and aquatic habitat, such as establishing a shoreline management zone thereby restricting clearing of vegetation larger than 3 inches in diameter in designated areas from normal pool elevation to 50 feet landward. Implementation of this measure would decrease shoreline vegetation loss and preserve aquatic habitat.

Redbud Reservoir has approximately 5 miles (26,400 feet) of shoreline, and the majority of the shoreline has woody vegetation. Approximately 3,400 feet of shoreline property would likely be impacted by the proposed residential development. TVA has revised Attachment C to articulate this measure, where feasible, in order to further reduce impacts to shoreline vegetation and aquatic habitat.

The effects to vegetation and aquatic habitat along the 3,400-foot stretch of shoreline associated with the residential development would be reduced by implementing protective measures described. In the draft EA, TVA concluded that potential impacts to aquatic ecology would be insignificant under Alternative B,



which included the proposed sale of the lots. For these reasons, TVA has determined these issues were assessed and that potential effects to aquatic resources would be insignificant.

The TWRA also expressed concerns regarding water use facility designs having the ability to withstand boat wakes and the proposed restrictions of motorized personal watercraft (PWC) on Redbud Reservoir.

**Response:** There are not any TVA regulations that address water use facility durability in terms of wave action from boat wakes. However, TVA has revised Attachment C to indicate that water use facilities will be constructed to withstand boat wakes.

All other reservoirs managed by BRWDA have restrictions against PWC in place, with the exceptions of Pine and Beech reservoirs. There are no proposed changes to this current policy in the draft EA. Additionally, there have not been any reported problems regarding the enforcement of the restriction that is already in place.

The TDEC expressed concern regarding the appropriate permits that would be required by the future landowners.

**Response:** Page 6 of the final EA has been revised to include stipulations that future homeowners would be required to acquire more detailed permit information.

The TDEC noted that Browns and Dry creeks are Tier 2 only within the Natchez Trace State Park and Forest.

**Response:** The text in the final EA has been corrected to indicate that Browns and Dry creeks are Tier 2 only within the State Park and Forest.

TDEC expressed disagreement regarding the draft EA's determination that water quality impacts to Redbud Reservoir would be temporary and compares them to Beech Reservoir water quality impacts.

**Response:** TDEC compares potential water quality impacts to Redbud Reservoir with impacts that have occurred on Beech Reservoir resulting from over 30 years of residential development. The current regulations are more stringent than past regulations. TVA will not be issuing permits to the landowners; permits will be acquired from the state. Potential water quality impacts resulting from construction would be temporary. Compliance with the state's current regulations and best management practices would minimize impacts to water quality in the long term.

Additionally, Beech has much more recreation usage than the other reservoirs in the Beech River project. On page 16 of the draft EA, TVA notes that Beech has approximately 464 daily users, compared to 10 daily users on Redbud. The improved and more stringent shoreline management guidelines described in the draft EA and Attachment C, combined with the lower recreation usage, maintain TVA's determination that water quality impacts would be temporary.

TDEC commented on the stream habitat scores described in the draft EA and indicated the scores may result in the division assessing them as impaired.

**Response:** TVA's process for assessing streams is not the same as TDEC's processes. A visual rapid habitat assessment protocol was used to evaluate stream channel condition. This evaluation does not consider biological criteria and should not be considered equivalent to the TDEC stream bioassessment procedure. If these streams are assessed in the future and designated as impaired by TDEC, landowners would be required to follow appropriate state requirements for buffer zones.

TDEC expressed concern that the wetlands identified in the draft EA were not previously identified by the applicant in the notice of intent or storm water pollution prevention plan (SWPPP). Additionally, TDEC indicated the plan must be updated and resubmitted if the project proceeds.

**Response:** TVA has contacted Mr. Jowers of the Beech River Watershed Development Authority and communicated the comment. TVA recommended the applicant revise and resubmit the SWPPP to include the new wetland information identified during the environmental review. The applicant's permit acquisitions do not have a bearing on the draft or final EA's determinations.

TDEC expressed disagreement with the draft EA's determination that there would be insignificant cumulative impacts associated with the Action Alternative.

**Response:** TVA respectfully disagrees with this response. However, the Cumulative Impacts section, page 23, of the draft EA has been revised to further explain TVA's rationale in determining that cumulative impacts associated with the Action Alternative would be insignificant.

CHESIN    GIBLER    HANDEMAN    HARRIS    HAYWOOD    HENDERSON    HANSEN    HODMAN

October 29, 2008

Mr. Daniel H. Ferry  
Senior Manager  
Environmental Services and Programs  
Office of Environment and Research  
Tennessee Valley Authority  
400 West Summit Hill Drive, WT 11D  
Knoxville, Tennessee 37902

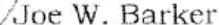
RE: DRAFT ENVIRONMENTAL ASSESSMENT (DEA) - REQUEST FOR  
TENNESSEE VALLEY AUTHORITY (TVA) APPROVAL FOR THE  
SALE OF 71 ACRES OF TVA PROPERTY ON REDBUD RESERVOIR,  
HENDERSON COUNTY, TENNESSEE

Dear Mr. Ferry:

The Southwest Tennessee Development District is responding to your request for comments on the project referenced above.

The District has reviewed the project and finds no conflicts with any needs, plans, or priorities of our agency.

Sincerely,

  
Joe W. Barker  
Executive Director

Joe W. Barker  
Executive Director



# United States Department of the Interior

FISH AND WILDLIFE SERVICE

446 Neal Street  
Cookeville, TN 38501

11/17/08

November 14, 2008

Ms. Peggy Shute  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, Tennessee 37902-1499

Re: FWS #09-FA-0015

Dear Ms. Shute:

Fish and Wildlife Service personnel have reviewed the October 1, 2008, project analysis concerning the Indiana bat for the sale of 71 acres adjacent to Redbird Reservoir in Henderson County, Tennessee.

The project analysis is adequate and supports the conclusion of not likely to adversely affect, with which we concur. In view of this, we believe that the requirements of section 7 of the Endangered Species Act (Act) have been fulfilled. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered in this project analysis, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Your interest and initiative to protect endangered and threatened species is greatly appreciated. If you have questions or if we can be of further assistance, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,

*Mary E. Jennings*

*for*

Lee A. Barclay, Ph.D.  
Field Supervisor



## TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER  
P. O. BOX 40747  
NASHVILLE, TENNESSEE 37204

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October 31, 2008

Daniel H. Ferry  
Environmental Services and Programs  
Environmental Stewardship and Policy  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, TN 37902-1401

Re: Draft Environmental Assessment (DEA) – Request for Tennessee Valley Authority (TVA) Approval for the Sale of 71 Acres of TVA Property on Redbud Reservoir, Henderson County, Tennessee

Dear Mr. Ferry:

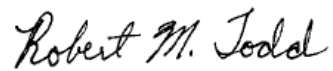
The Tennessee Wildlife Resources Agency received the Draft Environmental Assessment (DEA) – Request for Tennessee Valley Authority (TVA) Approval for the Sale of 71 Acres of TVA Property on Redbud Reservoir, Henderson County, Tennessee.

The Tennessee Wildlife Resources Agency provides the following comments on the Draft Environmental Assessment. One of our concerns is potential impacts to wetlands that are currently protected under TVA's current land management plan for Redbud Reservoir. Our concerns are minimized due to language under Section 4 of Executive Order (EO) 11990 in which TVA is obligated to establish mechanisms for protection of wetland on lands proposed for sale and the mechanisms TVA has established for wetland protection on page 13 of the Draft Environmental Assessment.

In addition to our concerns regarding wetland protection our Boating Division has some potential boating issues. We would prefer that TVA encourage future developers to include a design for community docks instead of individual docks to minimize the loss of shoreline fishing opportunities and shoreline vegetation loss. We request that the entirety of Redbud Reservoir be declared a no-wake zone or that permits for docks require the design to withstand boat wakes. We have concerns regarding enforcement of boating law depending on how the language is developed to restrict boating use (boats of like kind must be allowed on the lake; that is, if motorized boats are allowed, then specific types of motorized boats may not be banned, such as personal watercraft).

We thank you for the opportunity to comment on the Draft Environmental Assessment.

Sincerely,

A handwritten signature in black ink that reads "Robert M. Todd". The script is cursive and fluid, with the first letters of each word being capitalized and prominent.

Robert M. Todd  
Fish and Wildlife Environmentalist

cc: Allen Pyburn, Region I Habitat Biologist  
Steve Henderson, Region I  
Allan Peterson, Region I Assistant Manager  
Ed Carter, Chief of Boating Division



STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
WATER POLLUTION CONTROL  
401 CHURCH STREET  
6<sup>TH</sup> FLOOR L&C ANNEX  
NASHVILLE, TN 37243

October 31, 2008

Attention: Kelly R. Baxter  
Tennessee Valley Authority  
400 West Summit Hill Drive, WT 11D  
Knoxville, TN 37902

**Re: Draft Environmental Assessment  
Redbud Reservoir Beech River Watershed Development Authority Land Request  
Henderson County, Tennessee**

Dear Ms. Baxter:

Thank you for the opportunity to review and comment on the above referenced project in Henderson County, Tennessee, relative to any potential environmental impacts or concerns the Division of Water Pollution Control (division) may have.

The division has reviewed the information provided and offers the following comments on the Draft EA:

1. (Page 5) An Aquatic Resource Alteration permit will be needed if there are any alterations to waters of the state and coverage under the *Tennessee Construction General Permit for Storm Water Discharges from Construction Activities* (TNCGP) will be needed for any land disturbance of one acre or more. In the case that no waters of the state are altered or less than one acre of land is disturbed, appropriate erosion and sediment control measures must still be installed and maintained throughout the construction process to avoid pollution to nearby waters.
2. (Pages 7 & 8) Browns and Dry Creeks are Exceptional Tennessee Waters (Tier 2) only within the State Park and Forest.
3. (Page 9)
  - a. The division disagrees that water quality impacts would be temporary. Most impacts listed have been evident in Beech Lake and are permanent. Many proposals for minimizing impacts are regulations currently in place.
  - b. The habitat scores of the streams on the property may result in the division assessing them as impaired and to be listed as such. Such listing will require that 60 foot buffers be applied on each side of so listed streams.



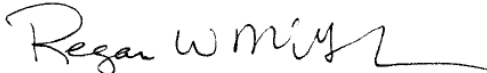
4. (Page 13) The wetlands and streams identified on the site in this EA were not identified on the Notice of Intent nor are they addressed in the Storm Water Pollution Prevention Plan (SWPPP) submitted by the BRWDA. The SWPPP must be updated and resubmitted if the project proceeds.
5. (Page 23) Given the negative impacts associated with the Action Alternative, WPC must disagree with the conclusion that there will be insignificant cumulative impacts.

Please note that in addition to the coverage required under the NPDES Permit for the Discharge of Stormwater from Construction Activities mentioned above, homeowners will also have to obtain permits from TDEC for the application of herbicides into waters and for alteration of wetlands, streams or the lake for the construction of sea walls, docks or boat ramps.

Please understand that there may be other regulatory programs applicable to this project that are administered by other divisions of the Department of Environment and Conservation. The applicant is responsible to determine all regulatory programs that are applicable to this project.

If you have any questions regarding these comments, please feel free to contact Patricia Patrick in the Jackson Environmental Field Office at (731) 512-1301 or Dana Borum in the Nashville office at (615) 532-1171.

Sincerely,



Regan W. McGahen  
Environmental Specialist  
Division of Water Pollution Control

RWMc/dsb

cc: Mary Parkman, TDEC-Office of General Council  
Pat Patrick, Water Pollution Control Manager, Jackson Environmental Field Office



## **Request for Land Transfer to Develop Private Cabin Sites**

In accordance with a nearly 50-year contractual relationship between TVA and the Beech River Watershed Development Authority (BRWDA), which oversees the development of the Beech River area, BRWDA is requesting that TVA sell at public auction 63 lots for the development of private cabin sites.

The location of the proposed development is Redbud Reservoir, Redbud Lake Subdivision, Unit 1, near Lexington, Tennessee. According to the contract, BRWDA would serve as TVA's agent at a public auction sale of the 63 lots.

TVA is interested in receiving comments on the potential of the proposed action to affect the environment and historic properties, as well as any other issues associated with this proposal. These comments will be used in reaching a decision concerning the proposed action.

All written comments on this proposed action must be received on or before June 7, 2008 and should be directed to:

Randy Lowe  
2835-A East Wood Street  
Paris, Tennessee 38242-5948  
(731) 641-2022  
relowe2@tva.gov



## Public Notice

[Return to previous page](#)

May 27, 2008

### Proposed Action

Request for land transfer

### Location

Redbud Reservoir, Beech River Project, Henderson County, Tennessee

### Description

In accordance with a nearly 50-year contractual relationship between TVA and the Beech River Watershed Development Authority (BRWDA), which oversees the development of the Beech River area, BRWDA is requesting that TVA sell at public auction 63 lots for the development of private cabin sites.

The location of the proposed development is Redbud Reservoir, Redbud Lake Subdivision, Unit 1, near Lexington, Tennessee. According to the contract, BRWDA would serve as TVA's agent at a public auction sale of the 63 lots.

TVA is interested in receiving comments on the potential of the proposed action to affect the environment and historic properties, as well as any other issues associated with this proposal. These comments will be used in reaching a decision concerning the proposed action.

All written comments on this proposed action must be received on or before June 30, 2008, and should be directed to:

Randy Lowe, TVA  
2835-A East Wood Street  
Paris, TN 38242-5948  
(731) 641-2022

Email: [relowe2@tva.gov](mailto:relowe2@tva.gov)



Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

July 22, 2008

Mr. E. Patrick McIntyre, Jr.  
Executive Director  
Tennessee Historical Commission  
Clover Bottom Mansion  
2941 Lebanon Road  
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TRANSFER OF 71 ACRES ADJACENT TO REDBUD RESERVOIR FOR PRIVATE  
DEVELOPMENT, HENDERSON COUNTY TENNESSEE

Beech River Watershed Development Authority (BRWDA) has requested that the Tennessee Valley Authority (TVA) sell 71 acres of land on Redbud Reservoir in Henderson County, Tennessee. This property lies along the southeast section of the 200-acre reservoir. The land would be sold at public auction in accordance with Section 31 of the TVA Act, and BRWDA would act as TVA's agent for the sale. BRWDA plans to develop the 71 acres of land on Redbud Reservoir in Henderson County, Tennessee, as a 63-lot residential community.

TVA originally entered into a contractual agreement with BRWDA in 1963 (TV-23429A) with the objective of furthering economic development in the Beech River area. This proposal is consistent with the existing contractual agreement.

Enclosed are two copies of a draft TRC Inc. report on a *Phase I Archaeological and Architectural Survey of 71 Acres on the Southeastern Margin of Redbud Reservoir*. TRC's survey for historic structures in the area of potential effect did not identify any architectural resources within the 71 acres of the project or within a half-mile radius of the project area. Two archaeological sites (40HE140 and 40HE141) were identified, but are minimal remains from 19<sup>th</sup> or 20<sup>th</sup> century occupations. Neither site retains *in situ* deposits. TVA has determined that these sites are not eligible for the National Register of Historic Places (NRHP).

Site 40HE142 is a small historic cemetery. Its location was noted in TVA acquisition maps, and two of four boundary posts were found in place. No documentation has been discovered that indicates the number of graves present. Although this cemetery is not eligible for NRHP, TVA will sell the lot (Exhibit 1) with the cemetery with a restrictive covenant. For example, TVA would include a restrictive covenant like the following:

*GRANTEE shall restrict use of the area as described in Exhibit A and shown on Exhibit B for cemetery purposes only. Grantee acknowledges by acceptance of the deed said area has been designated as a cemetery and will not build, disturb, or excavate said area except to maintain as a cemetery. GRANTEE may maintain said area by mowing or using customary lawn tools.*

Mr. E. Patrick McIntyre, Jr.  
Page 2  
July 22, 2008

In addition, there exist outstanding rights of ingress to and egress from the cemetery, and the lot will be sold subject to those existing rights.

TVA wishes to sell the lots abutting the reservoir with the right to place a fixed dock. This will project from the land no more than 25 feet adhering to BRWDA's policy governing water use. The Redbud Reservoir bottom was not surveyed before inundation. It is also a reservoir that does not have a seasonal drawing down of the water level. To assess the possibility of historic properties present within 25 feet of the shore, therefore, presents some unique challenges. Exhibits 2 and 3 are aerial photographs taken of the project area in 1946 and 1960 respectively. Clearly most of the reservoir bottom has been under cultivation for some time. Exhibits 4 and 5 are the 1946 and 1960 aerial photographs georeferenced to, and overlapping, the Chesterfield Quad map. There is no visible evidence of any structures present within 25 feet of the shore. TVA therefore believes that it is highly unlikely that there are significant historic properties present that could be affected by fixed docks.

As per 36CFR800 implementing Section 106 of the *National Historic Preservation Act*, TVA seeks your concurrence with these determinations.

If you have any questions contact me at 865-632-7452 or [tomaher@tva.gov](mailto:tomaher@tva.gov).

Sincerely,

*Original signed by Thomas O. Maher*

Thomas O. Maher, Ph.D.  
Manager  
Cultural Resources

TOM:IKS  
Enclosures  
cc: EDMS, WT 11D-K



**TENNESSEE HISTORICAL COMMISSION**  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
2941 LEBANON ROAD  
NASHVILLE, TN 37243-0442  
(615) 532-1550

July 31, 2008

Dr. Thomas Maher  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, Tennessee 37902-1499

RE: TVA, ARCHAEOLOGICAL ASSESSMENT, 71 ACRES NEAR REDBUD RESERVOIR,  
UNINCORPORATED, HENDERSON COUNTY, TN

Dear Dr. Maher:

At your request, our office has reviewed the above-referenced cultural resources survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we find that the project area contains no historic properties eligible for listing in the National Register of Historic Places.

If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

 E. Patrick McIntyre, Jr.  
Executive Director and  
State Historic Preservation Officer

EPM/jmb



**United Keetoowah Band  
Of Cherokee Indians in Oklahoma**

P.O. Box 746 • Tahlequah, OK 74465  
2450 S. Muskogee • Tahlequah, OK 74464  
Phone: (918) 431-9998 • Fax: (918) 431-1873  
[www.ukb-nsn.gov](http://www.ukb-nsn.gov)

July 29, 2008

**COUNCIL**

George Wickliffe  
Chief

Charlie Locust  
Assistant Chief

Liz Littledave  
Secretary

Shelbi Wofford  
Treasurer

Eddie Sacks  
Canadian District

Cliff Wofford  
Cooweescoowee District

Jerry Hanson  
Delaware District

Woodrow Proctor  
Flint District

Joyce Fourkiller  
Goingsnake District

Susan Adair  
Illinois District

Adalene Smith  
Saline District

Barry Dotson  
Sequoyah District

Albert Shade  
Tahlequah District

Patricia Bernard Ezzell  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, TN 37902-1499

Dear Pat:

We are in receipt of your letter dated July 22, 2008, regarding the Transfer of 71 acres adjacent to Redbud Reservoir for Private Development, Henderson County, Tennessee. Although we are against any TVA land being sold for residential (or any other) development, we understand this is within the auspices of the land policy and previous contract with the developer.

In addition to the covenant specified in the letter regarding the historic covenant, we would like to see an additional covenant which includes possible inadvertent discoveries in the future.

Best Regards,

Lisa C. LaRue-Stopp  
Interim Director, Language, History and Culture  
Acting Tribal Historic Preservation Officer

Cc: Chief George Wickliffe





## *Jena Band of Choctaw Indians*

P. O. Box 14 • Jena, Louisiana 71342-0014 • Phone: 318-992-2717 • Fax: 318-992-8244

August 19, 2008

Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, TN 37902-1499

**RE: TRANSFER OF 71 ACRES ADJACENT TO REDBUD RESERVOIR FOR  
PRIVATE DEVELOPMENT, HENDERSON COUNTY, TENNESSEE**

To Whom It May Concern:

Reference is made to your letter dated July 22, 2008, concerning the above-proposed project.

After thorough review of the documents submitted, it has been determined that there will be no significant impact in regards to the Jena Band of Choctaw Indians.

Should you have any questions, please feel free to call me.

Sincerely,

Lillie McCormick  
Environmental Director  
Jena Band of Choctaw Indians  
Ph: 318-992-8258  
Fax: 318-992-8244  
[lmccormickjbc@centurytel.net](mailto:lmccormickjbc@centurytel.net)



## Choctaw Nation of Oklahoma

P.O. Box 1210 • Durant, OK 74702-1210 • (580) 924-8280

Gregory E. Pyle  
Chief

Gary Batton  
Assistant Chief

August 7, 2008

Pat Bernard-Ezzell  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, Tennessee 37902-1499

Dear Pat Bernard-Ezzell:

We have reviewed the following proposed project (s) as to its effect regarding religious and/or cultural significance to historic properties that may be affected by an undertaking of the projects area of potential effect.

Project Description: Transfer of 71 acres adjacent to Redbud Reservoir for Private Dev.

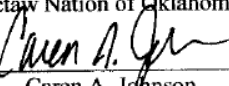
County-State: Henderson County, Tennessee

Comments: After further review of the above-mentioned project (s), it has come to our attention that the project is out of our area of interest. However, should construction expose buried archaeological or building materials such as chipped stone, tools, pottery, bone, historic crockery, glass or metal items, this office should be contacted immediately @ 1-800-522-6170 ext. 2137.

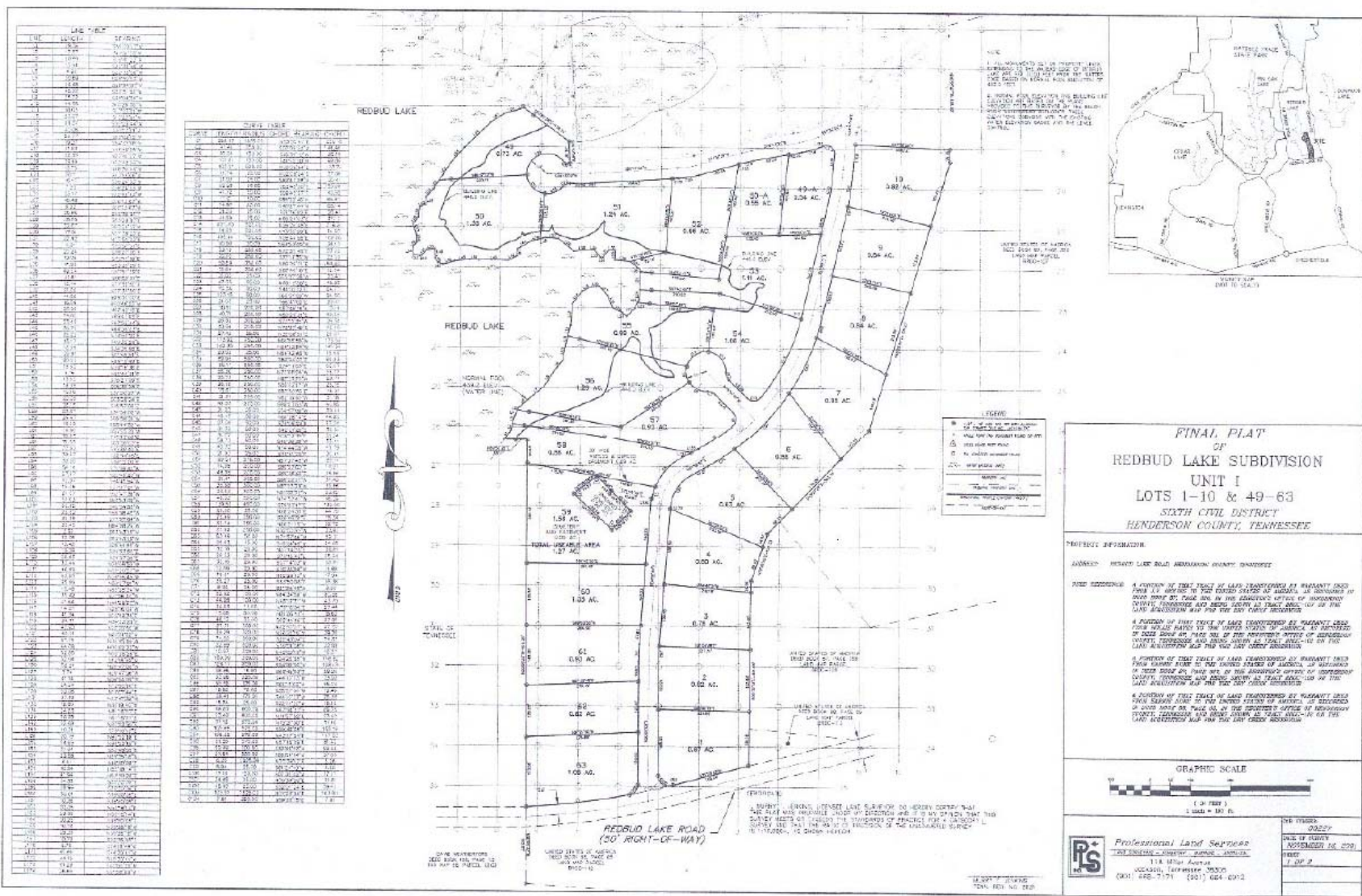
Sincerely,

Terry D. Cole  
Tribal Historic Preservation Officer  
Choctaw Nation of Oklahoma

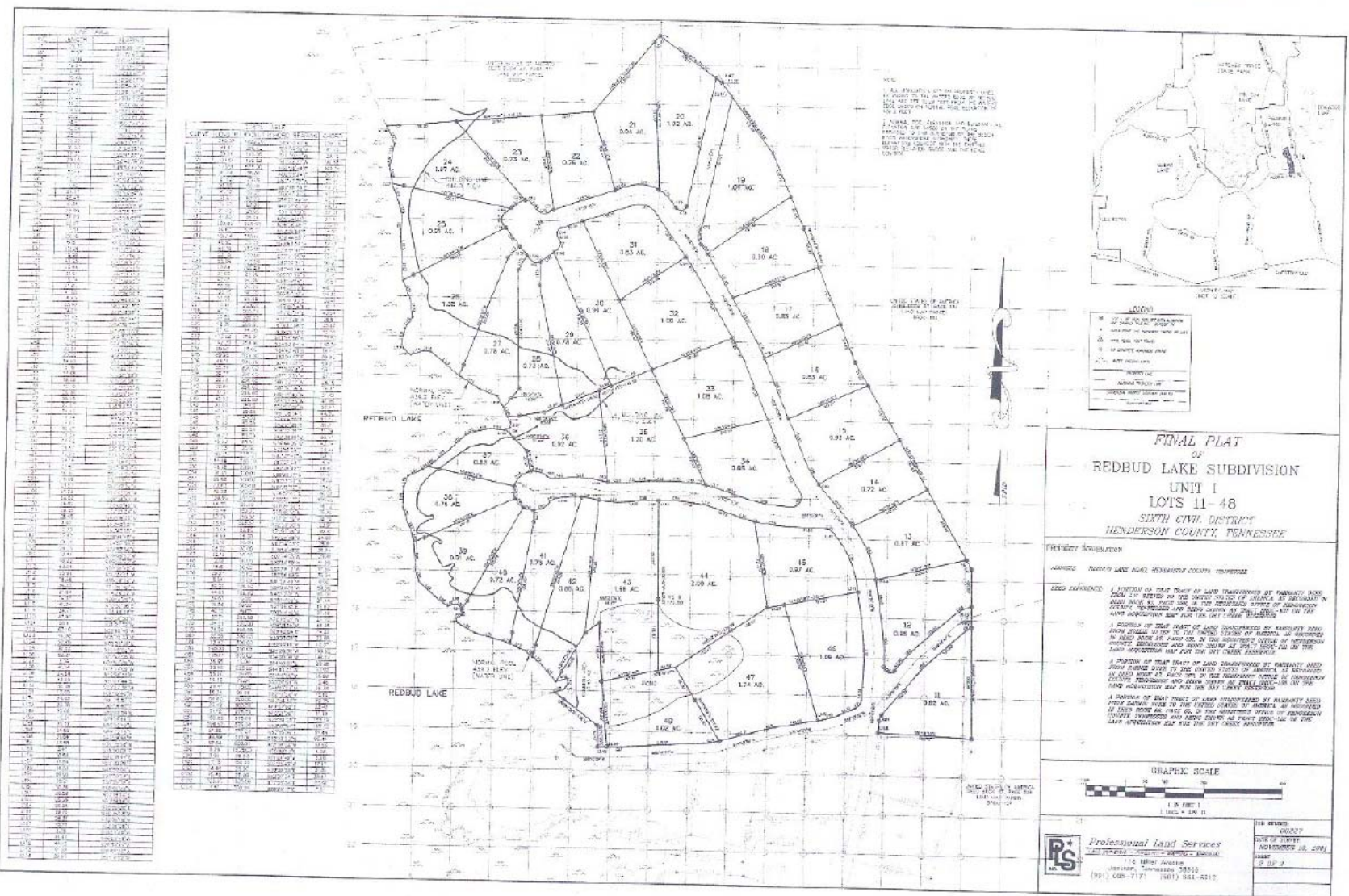
By:

  
Caren A. Johnson  
Administrative Assistant

CAJ: vr







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## **Attachment C - Policies and Provisions for Water Use and Related Facilities on Redbud Reservoir**

The regulation of water use facilities has been addressed in six sections to provide a comprehensive description of permissible facilities based on resource stewardship, landrights, and public benefit. These sections are:

- I. General statements
- II. Environmental standards and conditions
- III. Individual lakefront lots
- IV. Reservoir access lots or outlots
- V. Short-term uses by group users without landrights
- VI. Water use standards

These guidelines apply to residential water use facilities, specifically the construction of docks, piers, boathouses (fixed and floating), retaining walls, and other structures and alterations, including channel excavation and vegetation management, on or along Redbud Reservoir shoreline area.

The BRWDA executive secretary shall administer these regulations and interpret policy pertaining to standard requests covered herein.

Special requests that are unique and/or not defined by these policies shall be brought before the BRWDA Board or its appointed committee(s).

### **I. GENERAL STATEMENTS**

- A. Subdivision lots are sold to normal summer pool elevation 439.16 and contain easement restrictions prohibiting permanent structures below the maximum shoreline contour (msc) 445.4 elevation.
- B. Boats or any floating structures containing living quarters or toilet facilities are not permitted.
- C. The shoreline management zone (SMZ) includes the area of land beginning at the normal pool elevation 439.16 and extending 50 feet inland from the reservoir.
- D. All land-disturbing activities shall be conducted in accordance with best management practices as defined by Section 208 of the *Clean Water Act* to control erosion and sedimentation to prevent adverse water quality and related aquatic impacts. Such practices shall be consistent with sound engineering and construction principles; applicable federal, state, and local statutes, regulations, or ordinances; and proven techniques for controlling erosion and sedimentation, including any additional required conditions.
- E. Filling to achieve sufficient ground elevation for the accommodation of residential construction may be permitted, if practical, provided all fill material is placed above half of the distance between the maximum pool (elevation 445.4) and spillway crest elevations (elevation 442.36).

- F. Water use facilities shall be placed entirely within the lot lines or property boundaries as they are projected from their intersection with the normal pool elevation of 439.16.
- G. Land-based structures on the easement area shall be placed a minimum of 15 feet from adjacent property lines.
- H. All floating facilities must be designed to fluctuate with changing reservoir levels up to the designed maximum flood elevation of 445.4.

## **II. ENVIRONMENTAL STANDARDS AND CONDITIONS**

### **A. General Conditions**

- 1. Landowners agree to make every reasonable effort to construct and operate the facility in a manner to minimize any adverse impacts on water quality, aquatic life, wildlife, vegetation, and natural environmental values.
- 2. Landowners would not use or allow the use of the premises, facilities, or structures for any purposes that would result in draining or dumping into Redbud Reservoir of any refuse, sewage, or other material in violation of applicable standards or requirements relating to pollution control of any kind now in effect or hereinafter established.
- 3. A vegetation management plan (VMP) would be developed by landowners to appropriately manage Redbud Reservoir shoreline.
- 4. Disturbed sites must be promptly stabilized with seeding, vegetative planting, erosion-control netting, and/or mulch material.

### **B. Surface Water**

- 1. Compliance with all applicable environmental laws and regulations.
- 2. Implementation of control measures to prevent the discharge or loss of potential pollutants to the reservoir and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants.
- 3. Compliance with state requirements for septic systems, including all wastewater disposal septic systems must approved by TDEC and be set back 2 feet vertically and 50 feet horizontally from the normal maximum reservoir elevation.
- 4. Agreement to apply only USEPA-registered herbicide in areas requiring chemical treatment. Label directions are designed in part to restrict applications in the vicinity of receiving waters and to prevent unacceptable aquatic impacts.

### **C. Floodplains**

- 1. Any future facilities or equipment subject to flood damage would be located above the approximate 500-year flood elevation 444.5.
- 2. You are advised that TVA retains the right to flood the area up to the msc elevation 445.4 and that TVA would not be liable for damages resulting from flooding.



3. Construction by-products are to be removed from the site and properly recycled or disposed of outside of the 100-year floodplain. Appropriate best management practices would be used during the removal of any abandoned roadway or structures.

#### D. Shoreline Stabilization

1. For purposes of shoreline bank stabilization, all portions would be constructed or placed, on average, no more than 2 feet from the existing shoreline at normal pool elevation.
2. Bank, shoreline, and floodplain stabilization would be permanently maintained in order to prevent erosion, protect water quality, and preserve aquatic habitat.

#### E. Streams

1. Provide all natural stream values (including equivalent energy dissipation, elevations, and velocities; riparian vegetation; riffle/pool sequencing; habitat suitable for fish and other aquatic life) at all stream modification sites using a combination of rock and bioengineering.
2. Culverts are to be constructed in phases, employing adequate stream bank protection measures, such that the diverted stream flow is handled without creating stream bank or streambed erosion/sedimentation and without preventing fish passage.
3. Concrete box culverts and pipe culverts (and their extensions) must create/maintain velocities and flow patterns that offer refuge for fish and other aquatic life and allow passage of indigenous fish species under all flow conditions.
4. Culvert floor slabs must be buried below streambed elevation and filled with naturally occurring streambed materials. If geologic conditions do not allow burying the floor, it must be otherwise designed to allow passage of indigenous fish species under all flow conditions.

#### F. Wetlands

1. Landowners would not be permitted to build structures, operate equipment, or make improvements of any nature on any portion of the wetland area.
2. Landowners would not be permitted to make any modifications to or alter any wetlands, including dredging activities, or place fill material on any portion of the easement area.
3. Landowners are to conduct activities that could affect any wetlands in accordance with Section 404 of the *Clean Water Act* as well as all other federal, state, or local statutes or ordinances relating to wetland regulations.
4. Landowners agree to actively maintain the easement area to prevent erosion, protect water quality, and preserve aquatic habitat.
5. Clearing of invasive understory plants such as poison ivy, Japanese honeysuckle, kudzu, and other exotic plants is allowed.

6. Selective thinning of trees or other vegetation less than 3 inches in diameter at the ground level is allowed.
7. Removal of trees greater than 3 inches in diameter at the ground level must be approved by BRWDA as part of the written request for vegetation management activities.
8. Within forested wetlands, the forest floor must be left undisturbed. (No mowing or weed eating would be allowed.)
9. Planting of noninvasive, trees, shrubs, wildflowers, and ground cover is allowed to improve or enhance the vegetative cover; the use of native plants specific to wetlands is preferred.
10. Any herbicides must be USEPA registered and applied according to label directions.

#### G. Archaeological and Historical Resources

1. The *Native American Graves Protection and Repatriation Act* and the *Archaeological Resources Protection Act* apply to archaeological resources located on the premises.
  - If landowner discovers human remains, funerary objects, sacred objects, objects of cultural patrimony, or any other archaeological resources on or under the premises, landowner shall immediately stop activity in the area of discovery, make a reasonable effort to protect the items, and immediately contact BRWDA, who would then contact TVA's Kentucky Reservoir Watershed Team. Work may not be resumed in the area of discovery until approved by TVA.
  - Landowners agree that if any historical or prehistoric archaeological material (such as arrowheads, broken pottery, bone, or similar items) is encountered during construction of the structure or facility, you would immediately contact BRWDA, who would then contact TVA's Kentucky Reservoir Watershed Team and temporarily suspend work at the location until authorized by TVA to proceed.

#### H. Best Management Practices

1. Removal of vegetation is to be minimized, particularly any woody vegetation providing shoreline/stream bank stabilization.
2. Cofferdams and/or silt control structures are to be installed between construction areas and surface waters prior to any soil-disturbing construction activity. Clarification of all water that accumulates behind these devices is to meet Tennessee state water quality criteria at the stream mile where activity occurs before it is returned to the unaffected portion of the stream. Cofferdams must be used wherever construction activity is at or below water elevation.
3. A floating silt screen extending from the surface to the bottom is to be in place during excavation or dredging to prevent sedimentation in surrounding areas. It is to be left in place until disturbed sediments are visibly settled.

4. Equipment is to be kept out of the reservoir or stream and off reservoir or stream banks, to the extent practicable.
5. Wet concrete is not to come into contact with the stream or reservoir, and there is to be no disposing of concrete washings, or other substance or materials, in those waters.
6. Erosion-control structures are to be used around any material stockpile areas.
7. Clean/shaken riprap or shot rock (where needed at water/bank interface) is to be applied over a water permeable/soil impermeable fabric or geotextile in such a manner as to avoid stream sedimentation or disturbance. Additionally, any rock used for cover and stabilization shall be large enough to prevent washout and provide good aquatic habitat.
8. Vegetation, rather than riprap, is to be used wherever practicable and sustainable to stabilize stream banks, shorelines, and adjacent areas. These areas are to be stabilized as soon as practicable. Stream bank and shoreline areas will also be stabilized with native woody plants, to include trees whenever practicable and sustainable.

### **III. INDIVIDUAL LAKEFRONT LOTS**

#### **A. Water Use Facilities**

1. Neither boathouses nor covered slips are allowed.
2. Water use facilities shall be designed and constructed to withstand boat wakes.
3. Fixed piers: One pier may be permitted per individual lakefront lot. Piers shall be constructed of factory treated wood with minimum nominal width dimensions of 2 inches (actual width 1.5 inches). The facility shall not exceed the dimension of 8 feet by 25 feet with the deck placed at least 1 foot above normal pool elevation.
4. Floats: One swimming or sunbathing float per individual lakefront lot. Floats shall be constructed of factory treated wood with minimum nominal width dimensions of 2 inches. The facility shall not exceed 150 square feet of surface area and be placed within projected lot lines. Floats shall not be placed more than 30 feet from the normal pool shoreline.
5. Water use facilities shall be placed a minimum of 50 feet apart where feasible.
6. Launch ramps: One ramp per lot. Boat-launching ramps shall be constructed of concrete or gravel and are not to exceed 12 feet in width.
7. Marine railways: One rail system per lot. The rails are not to be placed at least 15 feet from lot lines.
8. Swimming beaches: Sand or gravel beaches are permitted within projected lot lines.
9. Boat channels and or harbors: Channels and harbors are permitted, provided spoil materials are deposited above normal pool elevations and

adequate provisions are made to prevent erosion of spoil back into the reservoir.

10. Buoy lines: Buoys are permitted fronting swimming beaches only. They must be positioned within projected lot lines and within 30 feet from the normal pool shoreline.

#### B. Access to Water Use Facilities

1. The following shoreline standards would be followed:
  - a. A vegetation management plan (VMP) would be developed by landowners to appropriately manage Redbud Reservoir shoreline.
  - b. Clearing, planting, and maintaining grass in an access/view corridor up to 20-foot wide and no clearing of vegetation larger than 3 inches in diameter for 50 linear feet landward shoreline vegetation management zone from normal pool elevation is permitted.
  - c. Cutting/clearing of vegetation less than 3 inches in diameter from the SMZ to the maximum shoreline contour (msc) is permitted.
  - d. Removal of selected exotic and native invasive plants such as poison ivy in the SMZ.
  - e. Encouragement to plant desirable native species (such as red buckeye, spicebush, and river birch).
  - f. Removal of selected trees and bushes less than 3 inches in diameter outside SMZ.
  - g. Selective removal of side limbs for a view in the SMZ.
  - h. Water use facilities are required to be placed a minimum of 50 feet apart where feasible.

#### C. Utilities

1. Power, telephone, and water lines to serve water use facilities are permitted, provided they do not conflict with normal operations of the reservoir. All utility lines must be run underground below the msc.
2. Security lights are permitted provided the light is located above the msc or is attached to a facility that will float.
3. Ditches to direct surface drainage are permitted if adequately surfaced to prevent soil erosion.

#### D. Ground Improvements

1. Ground improvements are permitted only by BRWDA Board approval.
2. All materials used to stabilize the shoreline shall be aesthetically compatible with the subdivision development.
3. Fences are permitted to the normal shoreline contour.
4. Terraces and patios with or without covers are permitted, provided they are not enclosed by sides greater than 4 feet in height.
5. Picnic tables, benches, and grills are allowed without a permit.

6. Minor grading above normal shoreline contour and other ground-disturbing activities would be conducted in such a manner as to minimize soil erosion during and after the action.

#### **IV. RESERVOIR ACCESS LOTS OR OUTLOTS**

##### **A. General Statements**

1. Reservoir access lots or outlots are platted lakefront lots that provide reservoir access and the opportunity for back-lying lot owners to have water use facilities.
2. Since approved facilities will be common use for all lot owners having an undivided interest in the outlot, a nonprofit community improvement corporation or association of lot owners must be developed and chartered or formally recognized by BRWDA. The organization shall develop policies and provide plans for common use facilities to be reviewed by BRWDA.
3. Facilities shall be permitted to the organization of lot owners. Multiple slip or group facilities may be approved by BRWDA without majority consent from holders of common lot interests. Individual requests for water use facilities shall require majority consent from holders of common lot interests. Any approved facility shall be designed to allow for the development of additional slips.
4. Installation of fences, lights, and other security facilities are permitted to the lot owner's organization, provided they meet the regulations established herein.

##### **B. Water Use and Water Access Facilities**

1. Piers or other fixed or floating dock facilities are permitted, provided they meet the general regulations and guidelines herein stated. Total lengths, widths, and other size dimensions established for individual lot facilities will be applied to group facilities. The overall size or number of slips permitted will be determined for each cluster of units according to the lakefront situation (i.e., harbor limits, common lot shoreline length, etc.). Each cluster of units or group facility shall be separated by at least 100 feet.
2. All other water use and water access facilities that are allowed for individual lakefront lots may be permitted on common lots, provided procedures established herein are followed.

#### **V. SHORT-TERM USES BY GROUP USERS WITHOUT LANDRIGHTS**

##### **A. Special Events**

1. Group users such as clubs or organizations both public and quasi-public in nature, may request temporary facilities for special events.
2. Permits for special events may be issued by BRWDA and may include special user fees, security deposits, and insurance coverage based on the type activity proposed and its duration.

## **VI. WATER USE STANDARDS**

- A. Water skiing is not allowed.
- B. Motorized personal watercraft (PWC) are not allowed.

## **Attachment D - Vegetation Management Plan Guidelines**

### **Vegetation Management Plans**

A vegetation management plan (VMP) will be developed for every new water use facility. A shoreline management zone (SMZ) and access corridor will be part of every VMP. Preparation of a VMP in partnership with the adjacent land owner would assist in protecting shoreland and aquatic resources while allowing access to the shoreline and reservoir. Maintaining or planting native vegetation helps restore riparian values.

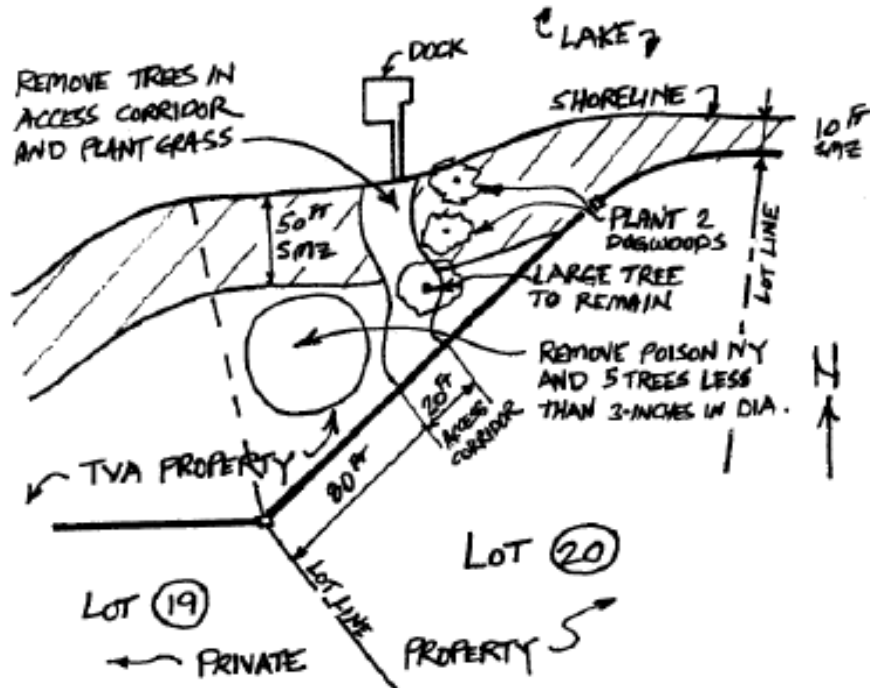
Landowners will consider the following when planning for shoreline access structures:

- Clearing, planting, and maintaining grass in an access/view corridor up to 20 feet wide
- Removal of selected native or exotic invasive plant species such as poison ivy in the SMZ
- Encouragement to plant desirable native species such as dogwood trees
- Removal of selected trees and shrubs less than 3 inches in diameter outside the SMZ
- Selective removal of side limbs for a view within the SMZ

VMPs are to be simple sketches rather than detailed landscape plans. Adjacent property owners should submit a VMP when requesting approvals for a water use facility. Dimensions should be kept to a minimum and obtained by simple methods such as pacing.

### **Vegetation Management Plan Examples**

- A complete VMP is a plan and a list that specifies what is to be completed regarding shoreline vegetation management, reservoir access, and water use facilities.
- Be sure to locate access/view corridor with a dimension from a property line or other natural landmark.
- One or two SMZ signs should be placed at the boundary for a reminder to adjacent landowners.
- When an SMZ is first established, work with the adjacent landowner using the VMP and vegetation options as a partnership agreement for management of the reservoir shoreland.



#### Changes proposed for Lot 20

- Remove vegetation in access corridor except for one large tree.
- Plant and maintain grass in access view corridor.
- Plant two dogwood trees along the shoreline in the SMZ.
- Remove selected trees and shrubs less than 3 inches in diameter in the SMZ.
- Other trees, shrubs, and groundcover vegetation would remain.



## **Attachment E - Summary of Plant and Animal Species Found Within the Study Area As Reported by ARCADIS Biologists**

The majority of the vegetative cover throughout the study area consists of mixed mesophytic oak-hickory forest, with variations occurring along the riparian corridors, wetland areas, and along the tops of upland ridges.

### Dominant Plant Species Found in Upland Areas

White oak (*Quercus alba*), southern red oak (*Q. falcata*), shagbark hickory (*Carya ovata*), mockernut hickory (*C. tomentosa*), wild black cherry (*Prunus serotona*), dogwood (*Cornus sanguinea*), winged elm (*Ulmus alata*), black locust (*Robinia pseudoacacia*), and persimmon (*Diospyros virginiana*).

### Dominant Plant Species Found on Ridge Tops

Eastern red cedar (*Juniperus virginiana*) and loblolly pine (*Pinus taeda*). Dominant species within the immediate riparian corridors consisted of tulip poplar (*Liriodendron tulipifera*), beech (*Fagus grandiflora*), sugarberry (*Celtis laevigata*), hornbeam (*Carpinus caroliniana*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), pawpaw (*Asimina triloba*), and sassafras (*Sassafras albidum*).

### Wetland Plant Species Found Within the Study Area

Wetland plants were found near Redbud Reservoir shoreline and the wetland associated with the large pond. Woody plant species observed include hazel alder (*Alnus serrulata*), sweetgum (*L. styraciflua*), red maple (*A. rubrum*), sycamore (*Platanus occidentalis*), American elm (*Ulmus Americana*), green ash (*Fraxinus pennsylvanica*), and silky dogwood (*Cornus amomum*). Herbaceous wetland species include sedges (*Carex* spp.), rushes (*Juncus* spp.), and ferns.

### Exotic-Invasive Plant Species Found Within the Study Area

Presence of invasive species within the study area was limited to a stand of Chinese privet (*Ligustrum sinense*) near the eastern edge of WTL-5 and Japanese honeysuckle (*Lonicera japonica*), which was found in various locations throughout the study area. Although common along forest edges of nearby roadsides, only one occurrence of a silk tree (*Albizia julibrissin*) was observed within the study area.

### Wildlife Species Found Within the Study Area

The forested upland and low-lying areas throughout the project provide foraging opportunities for resident and migratory birds, mammals, reptiles, amphibians, insects, and arachnids. Numerous burrows were observed in stream banks and hillsides, and tracks or signs of various animals including white tail deer, raccoon, and beaver were observed. Several species of skinks, as well as eastern box turtles, were observed during the field survey. These areas also provide habitat for wild turkey, downy woodpecker, pileated woodpecker, white-breasted nuthatch, and American crow, as well as neotropical migrants such as scarlet tanager, American redstart, wood thrush, red-eyed vireo, warbling vireo, and ovenbird. Wetlands and streams within the study area provide habitat for aquatic macroinvertebrates including mayflies, stoneflies, and crayfish, as well as several amphibian species verified during the study. These areas provide enhanced feeding and watering opportunities for local fauna.

Amphibian, mammalian, reptile, bird, invertebrate, and aquatic species observed during the field survey are presented in the tables below.

## Summary of Terrestrial Animal Species Observed – May 19 Through 22, 2008

Birds			
Ruby-Throated Hummingbird <i>Archilochus colubris</i>	Tufted Titmouse <i>Baeolophus bicolor</i>	Northern Cardinal <i>Cardinalis cardinalis</i>	Yellow-Billed Cuckoo <i>Coccyzus americanus</i>
Northern Flicker <i>Colaptes auratus</i>	Eastern Wood Pewee <i>Contopus virens</i>	American Crow <i>Corvus brachyrhynchos</i>	Blue Jay <i>Cyanocitta cristata</i>
Prairie Warbler <i>Dendroica discolor</i>	Pileated Woodpecker <i>Dryocopus pileatus</i>	Gray Catbird <i>Dumetella carolinensis</i>	Acadian Flycatcher <i>Empidonax virens</i>
Worm-Eating Warbler <i>Helmitheros vermivorus</i>	Wood Thrush <i>Hylocichla mustelina</i>	Yellow-Breasted Chat <i>Icteria virens</i>	Red-Bellied Woodpecker <i>Melanerpes carolinus</i>
Indigo Bunting <i>Passerina cyanea</i>	Downy Woodpecker <i>Picoides pubescens</i>	Eastern Towhee <i>Pipilo erythrophthalmus</i>	Summer Tanager <i>Piranga rubra</i>
Carolina Chickadee <i>Poecile carolinensis</i>	Blue-Gray Gnatcatcher <i>Polioptila caerulea</i>	Prothonotary Warbler <i>Protonotaria citrea</i>	Ovenbird <i>Seiurus aurocapillus</i>
White-Breasted Nuthatch <i>Sitta carolinensis</i>	Chipping Sparrow <i>Spizella passerine</i>	Barred Owl <i>Strix varia</i>	Carolina Wren <i>Thryothorus ludovicianus</i>
Brown Thrasher <i>Toxostoma rufum</i>	Eastern Kingbird <i>Tyrannus tyrannus</i>	White-Eyed Vireo <i>Vireo griseus</i>	Red-Eyed Vireo <i>Vireo olivaceus</i>
Hooded Warbler <i>Wilsonia citrina</i>			
Mammals			
American Beaver <i>Castor canadensis</i>	Whitetail Deer <i>Odocoileus virginianus</i>	Raccoon <i>Procyon lotor</i>	Eastern Grey Squirrel <i>Sciurus carolinensis</i>
Reptiles			
Five-Lined Skink <i>Eumeces fasciatus</i>	Broadhead Skink <i>Eumeces laticeps</i>	Ground Skink <i>Scincella lateralis</i>	Eastern Box Turtle <i>Terrapene carolina</i>
Red-eared Slider <i>Trachemys scripta elegans</i>			
Amphibians			
Southern Cricket Frog <i>Acris gryllus</i>	American Toad <i>Bufo americanus</i>	Fowler's Toad <i>Bufo fowleri</i>	Gray Treefrog <i>Hyla versicolor</i>
Green Frog <i>Rana clamitans melanota</i>			
Insects and Arachnids			
Honey Bee <i>Apis mellifera</i>	Bumble Bee <i>Bombus pennsylvanicus</i>	Wood Tick <i>Dermacentor</i> sp.	Eastern Sweat Bee <i>Dialictus zephyrum</i>
Field Cricket <i>Gryllus pennsylvanicus</i>	Ground Beetle <i>Harpalus</i> sp.	Black Ant <i>Monomorium minimum</i>	Differential Grasshopper <i>Melanophus differentialis</i>
Cicada <i>Platypedia</i> sp.	Orb-Weaver Spider <i>Araneidae</i> fam.		
Crustacean			
Chimney Crayfish <i>Cambaras</i> sp.			

## Summary of Aquatic Animal Species Observed, Browns Creek, Henderson County, Tennessee

Fish			
Yellow Bullhead <i>Ameiurus natalis</i>	Freshwater Drum <i>Aplodinotus grunniens</i>	Largescale Stoneroller <i>Campostoma oligolepis</i>	Flier <i>Centrarchus Macropterus</i>
Steelcolor Shiner <i>Cyprinella whipplei</i>	Redfin Pickerel <i>Esox americanus</i>	Blackspotted Topminnow <i>Fundulus olivaceus</i>	Western Mosquitofish <i>Gambusia affinis</i>
Northern Hog Sucker <i>Hypentelium nigricans</i>	Channel Catfish <i>Ictalurus punctatus</i>	Green Sunfish <i>Lepomis cyanellus</i>	Warmouth <i>Lepomis gulosus</i>
Bluegill <i>Lepomis macrochirus</i>	Longear Sunfish <i>Lepomis megalotis</i>	Redear Sunfish <i>Lepomis microlophus</i>	Spotted Sucker <i>Minytrema melanops</i>
Largemouth Bass <i>Micropterus salmoides</i>	Golden Shiner <i>Notemigonus crysoleucas</i>	Freckled Madtom <i>Noturus nocturnus</i>	Logperch <i>Percina caprodes</i>
Dusky Darter <i>Percina sciera</i>	Saddleback Darter <i>Percina vigil</i>	Bluntnose Minnow <i>Pimephales notatus</i>	White Crappie <i>Pomoxis annularis</i>
Black Crappie <i>Pomoxis nigromaculatus</i>	Flathead Catfish <i>Pylodictus olivaris</i>		

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## Attachment F - Summary of Aquatic and Wetland Resources Assessments

Stream No. (Figure F-1)	Stream Type	Estimated Stream Length (feet)
STR-1	Perennial	1,000+/-
STR-2	Intermittent	500+/-
STR-3	Perennial	1,000+/-
STR-4	Intermittent	500+/-
STR-5	Perennial	600+/-
STR-6	Intermittent	500+/-
STR-7	Perennial	1500+/-
STR-8	Intermittent	500+/-
STR-9	Intermittent	750+/-
STR-10	Intermittent	300+/-
STR-11	Perennial	1500+/-

Wetland No. (Figure F-1)	Wetland Type <sup>1</sup>	Wetland Acreage (acres)	TVARAM Score <sup>2</sup>
WTL-1	PFO1	0.25	59
WTL-2	PFO1	0.02	53
WTL-3	PSS1	0.03	59
WTL-4	PFO1	0.25	63
WTL-5	POWh/PFO1	1.65	64
WTL-6	POWh	0.12	45
WTL-7	PFO1	0.05	60
WTL-8	PFO1	0.18	60
WTL-9	POWh	0.03	42
<b>TOTAL</b>		<b>2.58</b>	

<sup>1</sup>Classification codes as defined in Cowardin et al. (1979): **PEM1** = palustrine emergent, persistent vegetation; **PSS1** = palustrine scrub-shrub, broadleaf deciduous; **PFO1** = palustrine forested, broadleaf deciduous; **POWh** = Palustrine, open water, permanently flooded

<sup>2</sup>See sample TVARAM Field Quantitative Rating Form



# Sample TVARAM Field Quantitative Rating Form

## TVARAM Field Form Quantitative Rating

Site: Redbud Reservoir – WTL-1

Rater(s): Tom Becktold / Erik Schmidt

Date: 05/20/2008

1

1

max 6 pts. subtotal

### Metric 1. Wetland Area (size)

Select one size class and assign score.

- ☐ >50 acres (>20.2 ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2 ha) (5) [BR/CM (6)]
- ☐ 10 to <25 acres (4 to <10.1 ha) (4) [BR/CM (6)]
- ☐ 3 to <10 acres (1.2 to <4 ha) (3) [BR/CM (5)]
- ☐ 0.3 to <3 acres (0.1 to <1.2 ha) (2) [BR/CM (3)]
- ☒ 0.1 to <0.3 acre (0.04 to <0.1 ha) (1) [BR/CM (2)]
- ☐ <0.1 acre (0.04 ha) (0)

Notes: BR/CM = adjusted points for Blue Ridge and Cumberland Mountains. If an open water body (excluding aquatic beds and seasonal mudflats) is >20 acres (8 ha), then add only 0.5 acre (0.2 ha) of it to the wetland size for Metric 1.

Sources/assumptions for size estimate (list):

The total square footage divided by 43,560 square feet (1 acre).

12

13

max 14 pts. subtotal

### Metric 2. Upland Buffers and Surrounding Land Use

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☒ WIDE. Buffers average 50 m (164 ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25 m to <50 m (82 to <164 ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10 m to <25 m (32 ft to <82 ft) around wetland perimeter (1)
- ☐ VERY NARROW. Buffers average <10 m (<32 ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☒ LOW. Old field (>10 years), shrubland, young 2nd growth forest (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field (3)
- ☐ High. Urban, industrial, open pasture, row cropping, mining, construction (1)

15

28

max 30 pts. subtotal

### Metric 3. Hydrology

3a. Sources of water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3) [BR/CM (5)]
- ☒ Precipitation (1) [unless BR/CM primary source (5)]
- ☒ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 m (27.6 in.) (3)
- ☐ 0.4 to 0.7 m (16 to 27.6 in.) (2) [BR/CM (3)]
- ☒ <0.4 m (<16 in.) (1) [BR/CM 0.15 to 0.4 m (6 to <16 in.) (2)]

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☒ Recovered (7)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100-year floodplain (1)
- ☒ Between stream/lake and other human use (1)
- ☐ Part of wetland/upland (e.g., forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl. check & avg.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3) [BR/CM (4)]
- ☒ Seasonally inundated (2) [BR/CM (4)]
- ☐ Seasonally saturated in upper 30 cm (12 in.) (1) [BR/CM (2)]

Check all disturbances observed

- ☐ ditch
- ☐ tile (including culvert)
- ☐ dike
- ☐ weir
- ☐ stormwater input
- ☐ point source (nonstormwater)
- ☐ filling/grading
- ☐ road bed/RR track
- ☐ dredging
- ☐ other \_\_\_\_\_

18

46

max 20 pts. subtotal

### Metric 4. Habitat Alteration and Development

4a. Substrate disturbance. Score one or double check and average.

- ☒ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☐ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☒ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☐ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☒ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

Check all disturbances observed

- ☐ mowing
- ☐ grazing
- ☐ clearcutting
- ☐ selective cutting
- ☐ farming
- ☐ toxic pollutants
- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ woody debris removal
- ☐ sedimentation
- ☐ dredging
- ☐ nutrient enrichment

46

subtotal this page

Last revised 2005-04-29

## Sample Aquatic Habitat Assessment Form

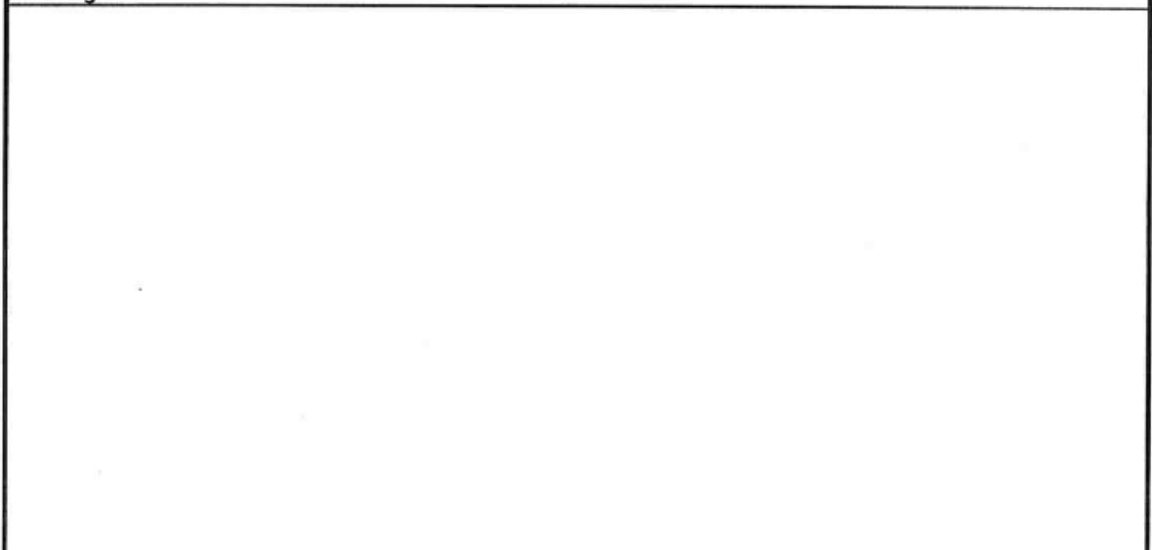
### Aquatic Habitat Assessment Form (WRS)

<b>Date:</b> 05/22/2008		<b>Project:</b> TVA Redbud Reservoir		<b>TOTAL SCORE</b>  37
<b>Stream ID:</b> STR-1		<b>Investigators:</b> Erik Schmidt / Tom Beckett		
<b>Stream Type:</b> Seasonal RPW	<b>Upstream Photo:</b> 4	<b>Downstream Photo:</b> 3, 5	<b>Slope *LDB:</b> 1/1 to 4/1 <b>Slope RDB:</b> 1/1 to 4/1	<b># Flags:</b> ~16
<b>Channel Width:</b> 2-5 ft.	<b>Wetted Width:</b> 6 in. - 3 ft.	<b>Centerpoint Latitude:</b> Not available		<b>Substrate:</b> Silt, gravel
<b>Channel Depth:</b> 6-18 in.	<b>Wetted Depth:</b> 0-4 in.	<b>Longitude:</b> Not available		<b>SMZ:</b> N/A

\*LDB: Left Decending Bank; RDB: Right Decending Bank

Habitat Parameter	4	3	2	1
<b>1. Instream Cover</b> (Fish Habitat) <u>1</u>	Greater than 50% mix of submerged logs, undercut banks or other stable habitat.	30-50% mix of stable habitat; adequate habitat for maintenance of populations.	10-30% mix of stable habitat; habitat availability less than desirable.	Less than 10% mix of stable habitat; lack of habitat is obvious.
<b>2. Epifaunal Substrate</b> (Benthic Habitat) <u>2</u>	Well developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
<b>3. Embeddedness</b> <u>2</u>	Gravel, cobble and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble and boulder particles are >75% surrounded by fine sediment OR substrate is homogenous (ie. Bedrock, sand, detritus, silt/mud/clay).
<b>4. Channel Alteration</b> <u>4</u>	No channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually on areas of bridge abutments; evidence of past channelization, i.e., dredging, (>past 20 yrs.) may be present, but recent channelization is not present.	New embankments present on both banks; and 40-80% of stream reach channelization and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
<b>5. Sediment Deposition</b> <u>3</u>	Little or no enlargement of islands or point bars and <5% of the bottom affected by sediment deposition.	Some new increase in bar formation mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
<b>6. Frequency of Riffles</b> <u>2</u>	Occurrence of riffles frequent; distance between riffles divided by width of stream = 5 to 7; variety of habitat is key. In highest gradient streams (e.g., headwaters), riffles are continuous, and placement of boulders or obstruction is evaluated as providing habitat diversity.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is greater than 25.



<b>7. Channel Flow Status</b> 1	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
<b>8. Bank Vegetation Protection (score each bank) Note: determine left or right bank by facing downstream.</b> L: 4 R: 4	> 90% of streambank surfaces covered by native vegetation, including trees, understory shrubs or nonwoody macrophytes; vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented; disruption evident but not affecting full plant growth potential to any great extent; >1/2 of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption, obvious patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	< 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation has been removed to 2 inches or less in average stubble height.
<b>9. Bank Stability (score each bank)</b> L: 3 R: 3	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable up to 60% of bank in reach has areas of erosion; high erosion potential during floods	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
<b>10. Riparian Vegetation Zone Width (score each bank)</b> L: 4 R: 4	Width of riparian zone > 18 meters; human activities have not impacted zone. (clearcuts, roads, parking lots, lawns, or crops)	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted greatly.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
<b>Drawing</b>				
				
<b>Description of watercourse, habitat, and/or other comments</b>				
1st order, unnamed tributary to Redbud Reservoir. Flow present throughout majority of channel, but reaches without flow up to 50 ft. are present. Channel is predominantly stable with areas of slight to moderate incision present at bends in channel. Multiple animal tracks and crayfish holes suggest stream supports food web.				

Last Modified: 3/20/06